EFFECTIVENESS OF BUERGER ALLEN EXERCISE ON LEVELS OF LOWER EXTREMITY PERFUSION AMONG PATIENTS WITH SELECTED NON COMMUNICABLE DISEASES NCDs ADMITTED AT SRI NARAYANI HOSPITAL AND RESEARCH CENTRE, VELLORE.

M.Sc (NURSING) DEGREE EXAMINATION

BRANCH-I MEDICAL SURGICAL NURSING

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CHENNAI- 600 032.

In partial fulfilment of the requirement for the degree of

MASTER OF SCIENCE IN NURSING.

APRIL-2016.

CERTIFICATE

This is to certify that this dissertation entitled **"EFFECTIVENESS OF BUERGER ALLEN EXERCISE ON LEVELS OF LOWER EXTREMITY PERFUSION AMONG PATIENTS WITH SELECTED NON COMMUNICABLE DISEASES (NCDs) ADMITTED AT SRI NARAYANI HOSPITAL AND RESEARCH CENTRE, VELLORE"** is a bonafide work done by **Mrs. Priya.N,** Sri Narayani College of Nursing, Vellore – 55, in the partial fulfillment of the requirement for the award of the degree of Master of Science in Nursing, Branch I -Medical Surgical Nursing, under my guidance and supervision during the academic period from April 2014-16.

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N. Priya

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LIST OF ABBREVIATIONS

ABI	Ankle Brachial Index
BMI	Body Mass Index
CIPP	Context Input Process Product
CVD	Cardio Vascular Diseases
DM	Diabetes Mellitus
HTN	Hypertension
LEA	Lower Extremity Amputation
LEAD	Lower Extremity Arterial Diseases
MI	Myocardial Infarction
NCDs	Non Communicable Diseases
NIDDM	Non Insulin Dependent Diabetes Mellitus
PAD	Peripheral Arterial Diseases
PVD	Peripheral Vascular Diseases
QOL	Quality of Life
SD	Standard Deviation
SMD	Standardized Mean Difference
SNHRC	Sri Narayani Hospital Research Centre
TBI	Toe Brachial Pressure
UK	United Kingdom
US	United States
WHO	World Health Organization

ABSTRACT

INTRODUCTION

Non communicable diseases (NCDs), also known as chronic diseases, are not passed from person to person. Diabetes mellitus and hypertension are interrelated diseases that strongly predispose an individual to atherosclerotic cardiovascular disease. Buerger Allen Exercise is one of the interventions to stimulate the development of collateral circulation in the legs.

STATEMENT OF THE PROBLEM

Effectiveness of Buerger Allen Exercise on levels of Lower Extremity Perfusion among Patients with selected Non- Communicable Diseases (NCDs) admitted at Sri Narayani Hospital and Research Centre (SNHRC), Vellore.

OBJECTIVES:

1. To assess the levels of lower extremity perfusion before Buerger Allen Exercise among patients with selected NCDs.
2. To assess the effectiveness of Buerger Allen Exercise on levels lower extremity perfusion among patients with selected NCDs.
3. To associate the post test levels of lower extremity perfusion among patients with selected NCDs and selected demographic variables.

METHODS

The research design selected was pre experimental one group pre and post test design. Purposive sampling Technique was adopted to select 40 patients of selected

NCDs admitted in SNHRC. Pilot study was conducted on 5 samples. Data were collected 6 weeks. Descriptive statistics and inferential statistics were used for analysis and interpretation of data.

RESULTS AND INTERPRETATION

The study findings revealed that the pre test ABI mean value of lower extremity perfusion was 0.77; check list for selected clinical features of PVD was 11.6. After the Buerger allen exercise the post test ABI mean value was 0.88, check list for selected clinical features of PVD was 8.45. The ABI paired 't' value of lower extremity perfusion 14.13 was greater than the table value 2.021 which was statistically significant at $p< 0.05$ level. The paired 't' check list for selected clinical features value 21.4 was greater than the table value 2.021 which was statistically significant at $p< 0.05$ level, Hence the effectiveness of Buerger Allen Exercise on level of lower extremity perfusion is proved. The 'chi' square value of demographic variables of ABI lower extremity perfusion for type of NCDs is significant at $p<0.05$ level. The 'chi'square value of demographic variables with check list for selected clinical features of PVD, the age of sample & BMI were found to be significant at $p<0.05$ level.

CONCLUSION

The majority of the patients in selected NCDs had shown significant improvement in the levels of lower extremity perfusion through Buerger Allen Exercise.

Key words: Effectiveness, Buerger Allen Exercise, levels of lower extremity perfusion, Peripheral vascular Disease, Non communicable disease.

CHAPTER-I

INTRODUCTION

"To enjoy the glow of good health, you must exercise"

-Gene Tunney.

Healthy life is the valuable gift of an individual, if a person is healthy enough he is the richest person in his own world. But there are certain disease condition which affects the normalcy of many people in our existing world, such as non communicable diseases, among which diabetes mellitus and hypertension is one of the important health issues in today's world which may affect the entire life pattern of an individual.

Non communicable diseases (NCDs), also known as chronic diseases, are not passed from person to person. They are of long duration and generally have slow progression. The 4 main types of non communicable diseases are cardiovascular diseases (like heart attacks and stroke), cancers, chronic respiratory diseases (such as chronic obstructed pulmonary disease and asthma) and diabetes. (**WHO: 2015)**

Currently, NCDs are the leading causes of death and disease burden worldwide. To reduce the burden of NCDs on global health, current public health actions stress the importance of preventing, detecting, and correcting modifiable risk factors; controlling major modifiable risk factors has been shown to effectively reduce NCD mortality.

Diabetes mellitus and hypertension are interrelated diseases that strongly predispose an individual to atherosclerotic cardiovascular disease. Essential hypertension accounts for the majority of hypertension in individuals with diabetes, particularly those with NIDDM (type II diabetes), who constitute more than 90% of people with a dual diagnosis of diabetes and hypertension.

Diabetes mellitus, known commonly as diabetes, is a disease that occurs when the pancreas does not produce enough insulin, or when the body cannot effectively use the insulin it produces. High blood sugar is a common effect of uncontrolled diabetes. Without the ability to diagnosis and properly manage symptoms, uncontrolled diabetes can cause serious damage to many of the body's systems, especially the nerves and blood vessels. Over time, uncontrolled diabetes can lead to complications with vision, poor circulation and amputation of affected limbs, kidney damage, heart disease, stroke, and death.

The Indian Diabetes federation estimated 381 million people have Diabetes globally in 2013 by 2035 this will rise to 592 million. The number of people with type 2 diabetes is increasing in every country and 80% of people with diabetes live in low- and middle-income countries. The greatest number of people with diabetes is between 40 and 59 years of age. India currently has 62.4 million people with diabetes and is home to the second highest number of people living with diabetes in the world. In India and other developing countries, the amputation rate is about 45% for peripheral arterial disease due to diabetes mellitus.

Hypertension (HTN or HT), also known as high blood pressure or arterial hypertension, is a chronic medical condition in which the blood pressure in the arteries is elevated. Blood pressure is expressed by two measurements, the systolic and diastolic pressures, which are the maximum and minimum pressures,

respectively, in the arterial system. The number of people living with hypertension (high blood pressure) is predicted to be 1.56 billion worldwide by the year 2025. **(American Heart Association: 2013)**

High blood pressure can increase the risk of diabetes complications such as diabetic eye and kidney problems. Diabetes also affects the arteries, making them more likely to develop atherosclerosis, or narrowing of the arteries. Atherosclerosis can cause high blood pressure, which if not treated, can lead to blood vessel damage, stroke, heart failure, heart attack or kidney failure.

Diabetes mellitus causes between two and four times increased risk of **Peripheral Arterial Disease (PAD)** by causing endothelial and smooth muscle cell dysfunction in peripheral arteries. The risk of developing lower extremity peripheral arterial disease is proportional to the severity and duration of diabetes.

Peripheral arterial disease (PAD) refers to diseases of blood vessels outside the heart and b rain. It's often a narrowing of vessels that carry blood to the legs, arms, stomach or kidneys.

"Peripheral artery disease has become a global problem in the 21st century and can no longer be regarded as a disease that affects mostly high-income countries. The dramatic growth in PAD is already a major public health challenge due to loss of mobility, diminished quality of life, and the significantly increased risk of **heart attack** and **stroke**." **(Gerry Fowkes : 2013)**

Peripheral Arterial Disease of the lower extremity is an important cause of morbidity and affects 10 million people in India. It is a common condition with variable morbidity affecting men and women over the age of 45 years. It is going to be a major health problem in our country as the Indian population is aging. Diabetes

increases the risk for PAD by approximately threefold. Many people with PAD may not know it, and while the condition is common it is also frequently overlooked.

Peripheral arterial disease is more frequent in those with diabetes mellitus and Hypertension. Epidemiological evidence confirms the association between Diabetes mellitus and Hypertension and also increased the prevalence of peripheral arterial disease. Individuals with diabetes mellitus and hypertension have a two to fourfold increase in the rate of peripheral arterial disease.

People with long standing Diabetes mellitus and Hypertension develop complication of PAD, which leads to grave complications like gangrene in the lower limbs. The most common symptom is muscle pain in the lower limbs on exercise. In diabetes, pain perception may be blunted by the presence of peripheral neuropathy. Therefore, a patient with diabetes and hypertension and peripheral arterial disease is more likely to present with an ischemic ulcer or gangrene than a patient without diabetes and hypertension. The use of ankle-brachial-pressure index in the clinic and bedside provide a measure of blood flow to the ankle. This could help early detection, initiate early therapy and may thus reduce the risk of critical limb ischemia and limb loss.

Buerger allen Exercise is one of the intervention to stimulate the development of collateral circulation in the legs. Primary Care Providers should focus on prevention by early recognition and prevention of PAD to those at increased risk. An awareness of diagnostic and treatment strategies will enable primary care providers to educate patients. This will help to improve both concordance with treatment and disease outcome. Considering the above factors and review of literature, the investigator felt that all diabetes mellitus and Hypertension patients should do the Buerger Allen exercise to improve lower extremity perfusion.

Though there is high prevalence rate (35%) of PAD in India, very few studies have been conducted in India. Researcher personally observed during clinical experience that many patients with diabetes mellitus and/or hypertension are admitted to the hospital with occurrence of PAD and Foot ulcer. The investigator found that the patients were not having adequate knowledge regarding disease condition and its preventive measures. Thus the investigator felt the need to educate and implement Buerger Allen Exercise for the patients to prevent PAD from the primary stage, so that complications can be prevented.

In the past decade, numerous studies have been conducted to investigate the effectiveness of Buerger Allen Exercise on lower extremity perfusion. Exercise plays a major role in preventing peripheral Arterial disease in Diabetes Mellitus and/or Hypertension.

NEED FOR THE STUDY

Type 2 diabetes mellitus (DM) and Hypertension (HT) are among the most common chronic non-communicable diseases and multifactorial disorders affecting both developed and developing countries and occur at a higher prevalence in the older age group and result from both genetic and environmental etiological factors. They are the main preventable risk factors for coronary heart disease, stroke, end-stage renal failure, disability and increased health-care costs.

Peripheral arterial disease (PAD) affects millions of people in the United States. The disease is more common in African Americans than any other racial or ethnic group. The major risk factors for PAD are smoking, older age, and having certain diseases or conditions like Diabetes, High blood pressure, High cholesterol, Coronary Artery Disease and Stroke.

Complications from undiagnosed and untreated PAD can be serious and even fatal. The restricted blood flow of PVD can be a warning sign of other forms of vascular disease. When arteries leading to the heart and brain become clogged with plaque, it can cause: heart attack, stroke, death.

In 2010 estimated 202 million people globally had peripheral arterial disease. The prevalence of the disease increases with age, from 1% of the population at age 40-49 years to 22.4% at age 80 or older. In an analysis of 48,294 study participants, peripheral arterial disease was associated with twice the risk of all cause mortality, and three times the risk of death from vascular causes over a mean follow-up of 10 years. Despite widespread availability and the use of effective risk modifying interventions in the United States and Europe, peripheral arterial disease remains a

leading cardiovascular cause of morbidity and mortality, and worldwide the burden from the disease is increasing.

According to the Centers for Disease Control and Prevention, around 8 million people in the US suffer from PAD, with between 12-20% of these aged 60 and over. But researchers from the UK and US have revealed that the number of people with peripheral artery disease worldwide has risen by 23.5% in the past 10 years, from 164 million in 2000, to 202 million in 2010.

Peripheral arterial disease (PAD) of the lower extremity affects 10 million people in India. The 5-year rate of nonfatal cardiovascular events (including MI and stroke) among patients with symptomatic PAD is 20%, mortality ranges from 15% to 30%.

Type 2 diabetes mellitus (DM) and Hypertension (HT) are among the most common chronic non-communicable diseases and multifactorial disorders affecting both developed and developing countries and occur at a higher prevalence in the older age group and result from both genetic and environmental etiological factors. They are the main preventable risk factors for coronary heart disease, stroke, end-stage renal failure, disability and increased health-care costs.

Diabetes Mellitus is an important risk factor of lower extremity arterial disease (LEAD) in India. Smoking and insulin resistance are frequently present in patients with diabetes and contribute an additional risk for vascular disease. Peripheral Vascular Disease (PVD) in diabetes is complicated by peripheral neuropathy and susceptibility to infection, which leads to foot ulceration, gangrene and amputation of the affected extremity. Diabetes accounts for 50% of all non traumatic amputations in India. Mortality is increased in diabetic patients with PVD. Three years survival after

an amputation is < 50%. In population based and epidemiology based studies, it is estimated that 20-30% of diabetic patients over 65 years of age have peripheral arterial disease. Approximately 30% of these diabetic patients with peripheral vascular disease require surgical or percutaneous revascularization. 10% require an amputation of the affected limb within 5-10 years of diagnosis. Progression from intermittent claudication to critical limb ischemia occurs at the rate of 1.4% per year. Five year mortality of diabetic patients with PVD approaches 30%.

Hypertension is a common and important risk factor for all vascular disorders, including Peripheral Vascular Disease. At presentation, between 2 and 5% of hypertensive patients have intermittent claudication and this prevalence increases with age; similarly, 35 to 55% of patients with Peripheral Vascular Disease at presentation also have hypertension.

A study was conducted to assess the association between the Peripheral vascular disease and hypertension among patients with hypertension at City hospital, Birmingham, UK. Peripheral vascular disease (PVD) is associated with a high cardiovascular morbidity and mortality. Intermittent claudication is the most common symptomatic manifestation of PVD, but is also an important predictor of cardiovascular death, increasing it by three-fold and increasing all-cause mortality by two to five-fold. Of hypertensives at presentation, about 2–5% have intermittent claudication, with this prevalence increasing with age. Similarly, 35–55% of patients with PVD at presentation also have hypertension. Patients who suffer from hypertension with PVD have a greatly increased risk of myocardial infarction and stroke. Hypertension, in common with PVD, is associated with abnormalities of haemostasis and lipids, leading to an increased atherothrombotic state. Nevertheless,

none of the large antihypertensive treatment trials have adequately addressed whether a reduction in blood pressure causes a decrease in PVD incidence. **(Makin: 2012).**

To assess the prevalence, incidence, etiology and factors related to progression of peripheral arterial disease [PAD] in Asian Indian type 2 diabetic patients at Tertiary diabetes centre in south India. 2512 T2 DM patients were followed for an average of 7years. 7.6% of the study population had PAD. 280 new patients of PAD were identified - crude incidence, 17/1000 patient years with higher rates in females. Age and duration of diabetes were the other predictors of incidence of PAD. Progression of PAD was seen in 16.5% of patients, with age (p=0.002) and HbA1c (p=0.022) being the predictors. The study concluded that women had a higher prevalence of PAD. Older age, female gender and duration of diabetes were related to an increased incidence of PAD. An elevated HbA1c being associated with progression of PAD stresses the need for strict control of diabetes**. (Eshcol: 2014)**

A study was conducted to quantify the distribution of the peripheral vascular disease in diabetics and non - diabetic patients attending angiography, to compare severity and the outcome between both groups of patients. The study was conducted in 136 patients and 58(43%) patients were diabetic. This study confirmed that diabetic patients have more worsened peripheral vascular disease and are at high risk of lower extremity amputation than non-diabetes patients. Diabetes patients with peripheral vascular disease also had high mortality and died at a younger age than non-diabetes patient **(Edwin Stephen: 2011)**.

To identify the effectiveness of the Buerger's Allen Exercise among PVD patients, a study was conducted among 13 patients. The study showed that increased subcutaneous blood flow during the patients doing the exercise, and this study also

revealed that the increased angle pressure and toe pressure during the exercise. The overall benefits are seen in 7 patients after 24 hours. The study concluded that the Buerger's Allen exercise is effective for improving the lower extremity circulation. **(David Sadhu: 2013)**

The aim of the study was to measure changes in foot perfusion following a brief period of lower limb exercise in individuals with and without type 2 DM and non critical PVD. Exercise has both positive and negative effects on post exercise tissue perfusion on the lower limb with peripheral vascular disease. The study was conducted among 61 patients. The result showed that post exercise, toe pressure and toe brachial pressure (TBI) increased in non -diabetic patients. But there was an elevated transcutaneous oxygen tension (TcPO2) value in diabetic patients and decreased transcutaneous carbon dioxide (TcPCO2) decreased in all arterial disease. The study concluded that the improvement in the TcPO2 and decreased TcPCO2 level in foot site in diabetes shows changes in cutaneous blood supply. The result suggested that brief exercise results in an improvement as cutaneous perfusion in non critical PVD particularly in patient with type 2 DM. **(Sunil Agarwal: 2013).**

A study was conducted to determine effectiveness of high –intensity training for intermittent claudication in vascular rehabilitation. The aim of the observational study was investigating the safety and effectiveness of the high intensity interval programme for the patient with peripheral vascular disease. This study was conducted among 47 patients, the result shows that the rehabilitation score with participation in the program and more exercise sessions led to greater improvement. More over no adverse event occurred in the study patients. The study suggested that, patients with PVD, can safely tolerate high intensity exercise programme. **(Nupur Bit: 2012).**

Exercise training for prevention of peripheral vascular disease among diabetic and hypertension patient helps in potential mechanisms like formation of collateral circulation and increased blood flow, changes in micro circulation and endothelial functions, changes in muscle metabolism and oxygen extraction, prevention of inflammation and muscle injury, cost effective, in preventing atherosclerosis and prothrombotic risk factors.

Considering the above factors and review of literature investigator felt that nurses have an important role in educating the patients regarding supervised exercise like Buerger's Allen exercise for improving the lower extremity perfusion among diabetic and hypertension patients. So there is a need to assess the effectiveness of Buerger's Allen exercise on improving the lower extremity perfusion among diabetic and hypertension patients.

STATEMENT OF THE PROBLEM:

Effectiveness of Buerger Allen Exercise on levels of Lower Extremity Perfusion among Patients with selected Non- Communicable Diseases (NCDs) admitted at Sri Narayani Hospital and Research Centre (SNHRC), Vellore.

OBJECTIVES:

1. To assess the levels of lower extremity perfusion before Buerger Allen Exercise among patients with selected NCDs.
2. To assess the effectiveness of Buerger Allen Exercise on levels lower extremity perfusion among patients with selected NCDs.
3. To associate the post test levels of lower extremity perfusion among patients with selected NCDs and selected demographic variables.

OPERATIONAL DEFINITION:

- **Effectiveness**: It refers to the significant difference in the levels of lower extremity perfusion before and after Buerger Allen Exercise in patients with selected NCDs, as measured by Ankle Brachial Index Scale and Checklist for selected clinical features of PVD.
- **Buerger Allen Exercise**: It is an active postural exercise, which help in filling and emptying the lower extremity blood vessels according to gravity alternatives and it refers to three steps of active postural exercise that includes elevation- 3 minutes, dependency- 10 minutes, and horizontal- 10 minutes, two times per day with 6 hours interval for the period of 5 days given to the patients by the researcher.

- **Lower extremity perfusion**: It refers to blood circulation to the lower extremity assessed before and after the intervention measured by Ankle Brachial Index Scale where the score is interpreted as >1- normal, 1.0-0.8- Mild PAD, 0.8-0.5- Moderate PAD, less than 0.5- severe PAD and checklist where the score is interpreted as 0-4-normal, 5-9-mild, 10-14- moderate, 15-18-severe level symptoms of PAD as prepared by researcher.

- **Patients with selected NCDs**: It refers to, patients both men and women of age group above 30 years who are diagnosed as Diabetes Mellitus and/or Hypertension.

HYPOTHESES:

- H_1- There is a significant difference between pre and post test levels of lower extremity perfusion due to Buerger Allen Exercise among patients with selected NCDs.

- H_2- There is a significant association between post test levels of lower extremity perfusion among patients with selected NCDs and demographic variables

DELIMITATIONS:

The study is limited to,

- Patients with Diabetes Mellitus and/or Hypertension.
- Aged above 30 years.
- Sample size of 40 only.
- Data collection period limited to 6 weeks only.

CONCEPTUAL FRAME WORK

Conceptualization is the process of forming ideas, designs and plans. Conceptual frame work deals with abstractions that are assembled by virtue of their relevance to a common theme. The present study aimed to evaluate the effectiveness of Buerger Allen Exercise on level of lower extremity perfusion among selected NCDs in SNHRC.

The conceptual framework set up for the study was modified model of Stuffle Beam's evaluation model of planned pogramme. **Daniel Stuffle Beam's "CIPP Model"** prescribes four areas of evaluation, context, input, process and product. It provides a comprehensive, systematic and continuously ongoing framework for programme evaluation.

Step I : Context evaluation

Step II: Input evaluation

Step III: Process evaluation

Step IV: Product evaluation

The core value for present study was to enhance the Buerger Allen Exercise on levels of lower extremity perfusion among patient with selected NCDs, at SNHRC.

Context evaluation

The context evaluation assess the needs, problems, assets and opportunities to help decision makers to define goals and priorities and help the broader group of users to judge goals, priorities and outcomes. The goal of a present study was to assess the level of lower extremity perfusion and practice of Buerger Allen Exercise.

The patients with Diabetes Mellitus and/or Hypertension have the risk of Peripheral Vascular Disease, So ABI scale and a check list for selected clinical features of PVD was prepared by the researcher to find the level of lower extremity perfusion.

Input evaluation

It involves the steps and resources needed to meet the goals and objectives and might include identifying successful external programmes and materials as well as gathering information. The input evaluation assess the alternative approaches, competing action plans, cost effectiveness to meet targeted needs and achieve goals.

The input evaluation step prepared the Demographic profiles and to measure the lower extremity perfusion by ABI Scale and checklist was prepared to assess the effectiveness of Buerger Allen Exercise on levels of lower extremity perfusion. The investigator prepared the demonstration of Buerger Allen Exercise and, planned to achieve the goals and objectives of the study.

Process evaluation

Process evaluation assess the implementation of plans to help the investigator carryout activities and later help the broad group of users, judge the program performance and interpret outcomes.

Action done in the step was pretest assessment of lower extremity perfusion of patients with selected NCDs using the Ankle Brachial Index Scale and Checklist prepared by the researcher. Buerger Allen exercise was administered five days in two times per day. The lower extremity perfusion was reassessed five days, after administration of Buerger Allen Exercise.

Product evaluation

The product evaluation identifies and assesses outcomes of short term and long term both intended and unintended, which help the investigator to keep an enterprise focused on achieving important outcomes and ultimately to help the broader groups in meeting targeted needs. The level of lower extremity perfusion improved after administration of Buerger Allen Exercise among patients with selected NCDs. The risk of Peripheral vascular disease is reduced and also the patients with selected NCDs will be able to practice Buerger Allen Exercise regularly.

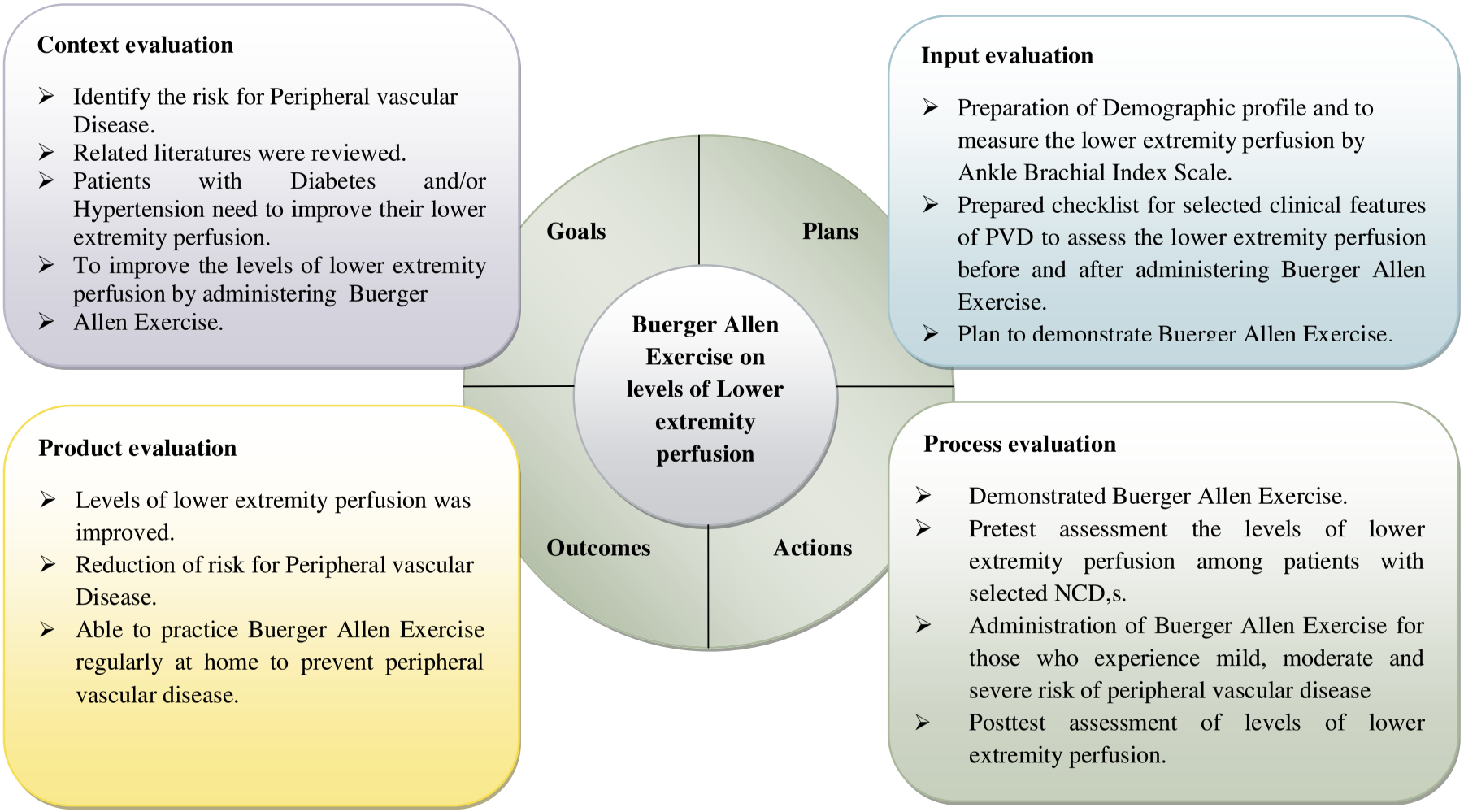


Figure1: Conceptual frame work based on Daniel Stuffle Beam's "CIPP Model" (1986)

CHAPTER – II

REVIEW OF LITERATURE

A literature review is a synthesis of the literature that describes what is known or has been studied regarding the particular research question **(Patricia.L.2012).**

The related literature has been organized under the following headings.
Section- A: Studies related to Peripheral vascular disease among Diabetes Mellitus.
Section- B: Studies related to Peripheral vascular disease among Hypertension.
Section- C: Studies related to effectiveness of Buerger Allen Exercise on lower extremity perfusion.

Section-A: Studies related to peripheral vascular disease among Diabetes Mellitus.

Cheng-Chieh Lin: 2015 A cross-sectional study was conducted to a well-established and non-invasive radionuclide method to objectively evaluate the anterior tibial muscle perfusion of 120 type II DM patients without symptoms/signs of peripheral vascular disease (PVD) in the lower extremities at Beijing, China. The patients were separated into groups according to the duration of the disease and condition of blood sugar control. Meanwhile, 60 normal control males with a matched age distribution were also included for comparison. The muscle perfusion were of significant difference between (1) 120 type II DM patients and 60 normal controls, (2) 72 patients with good sugar control and 48 patients with poor sugar control, as well as (3) 64 patients with short disease duration and (4) 56 patient with long disease duration. Based on the objective radionuclide method, study concluded that the muscle perfusion in the lower extremities of type II DM patients without

symptoms/signs of PVD is significantly decreased and related to the duration of the disease and condition of blood sugar control.

Ana Tereza: 2015 A cross- sectional study was conducted to evaluate the prevalence of newly diagnosed PAD and its associations with Quality of Life, Physical Activity and body composition in a sample of T2DM patient of University Hospital, Natal, Brazil. PAD was assessed using the ankle-brachial index (ABI) for 73 patients; QoL was measured using a translated and validated SF-36 questionnaire. PAD prevalence was 13.7%, predominantly of mild severity (ABI between 0.8-0.9). The ABI results correlated with age (ρ=-0.26, P=0.03), DM duration (ρ=-0.28, P=0.02) and systolic and diastolic blood pressure (ρ=-0.33, P=0.007 and ρ=-0.28, P=0.02; respectively). Scores for the SF-36 physical component summary (PCS) were below the normal range, but no negative impact from PAD was identified by the PCS scores (normal-ABI 42.9±11.2 vs. PAD-ABI 38.12±11.07) or the Baecke PA results. Body composition analysis detected excessive body fat, especially in women.

Adler: 2014 A prospective study to identify risk factors for lower-extremity amputation (LEA) in individuals with diabetes and to estimate the incidence of LEA. This is a prospective study of 776 U.S. veterans in a general medicine clinic in Seattle, Washington. Potential risk factors evaluated in proportional hazards models included, among others, peripheral vascular disease (PVD), sensory neuropathy, former LEA, foot deformities and ulcers, diabetes duration and treatment, and hyperglycemia. Associated with an increased risk for LEA were PVD defined as transcutaneous oxygen < or = 50 mmHg (relative risk [RR] = 3.0, 95% CI 1.3-7.1), insensitivity to monofilament testing (RR = 2.9, odds ratio = 1.1-7.8), lower-extremity ulcers (RR = 2.5, CI 1.1-5.4), former LEA, and treatment with insulin when

controlling for duration of diabetes and other factors in the model. PVD defined as absent or diminished lower-extremity pulses or an ankle arm index < or = 0.8 was also associated with a significantly higher risk of LEA in separate models. Foot ulcers were associated with an increased ipsilateral risk of amputation. The age-adjusted incidence among men only for LEA standardized to the 1991 U.S. male diabetic population was 11.3/1,000 patient-years. This prospective study shows that peripheral sensory neuropathy, PVD, foot ulcers (particularly if they appear on the same side as the eventual LEA), former amputation, and treatment with insulin are independent risk factors for LEA in patients with diabetes.

Juma M Al- Kaabi: 2014 A cross sectional study to assess the prevalence and associated risk factors in patients with type 2 diabetes mellitus who reside in the United Arab Emirates was conducted. The main purpose of the study was to identify potential disease modifiers that could be included in diabetic education programs. This cross-sectional study assessed PAD in 394 patients with type 2 diabetes mellitus. Each patient was investigated by history, physical examination and measurements of the ankle-brachial index (ABI) by bidirectional doppler. Patients' mean (±SD) age was 54 (±12) years and duration of diabetes 10 (±8) years. There were 264 females (67%). HbA1c was ≥7% in 247 (65%) patients, claudication present in 166 (42%) patients, reduced capillary refill time in 69 (17%) patients, retinopathy in 50 (13%) patients, and absent pulse in 20 (5%) patients. ABI was ≤1.0 in 149 (39%) patients (probable PAD) and <0.9 in 33 (9%) patients (significant PAD). Current smoking [odds ratio (OR) =3.9; confidence intervals (CI) =1.5-10.3; p-value=0.007], percent HbA1c (OR=3.4; CI=1.2-10.2; p-value=0.028) and hypertension on examination (OR=1.6; CI=1.0-2.6; p-value=0.041) were significant predictors of ABI ≤1.0. Current smoking (OR=3.7; CI=1.2-10.8; p-value=0.019) was

significant predictor of ABI <0.9. These results confirm the deleterious effects of smoking on diabetes-association PAD. Thus, diabetic patients should be engaged in effective smoking prevention programs. Other modifiable interventions are controlling hyperglycemia and hypertension. Patients with abnormal ABI (especially <0.9) should have stringent risk assessments and be started on an individualized risk-reduction program.

Samson Okello: 2014 A cross-sectional study was conducted to determine the prevalence and correlates of PAD among patients with diabetes at Mbarara Regional Referral Hospital in southwestern Uganda. Peripheral artery disease (PAD) is a major complication of atherosclerosis. The study consecutively enrolled diabetes patients aged 50 years or greater presenting to the outpatient clinic. Blood was collected for fasting lipid profile, HIV serology, and glycosylated hemoglobin, measured blood pressure, ankle brachial index, and administered the Edinburgh Claudication Questionnaire (ECQ). Patients were surveyed for other PAD risk factors. Logistic regression was used to determine correlates of PAD. They enrolled 229 diabetes patients. The median age of 60 years (IQR 55–66), and 146 (63.7%) were female. Fifty five patients (24%) had PAD (ABI of < 0.9). Of these, 48 /55 (87.27%) had mild PAD (ABI 0.71-0.9) while 7/55 (12.73%) had moderate to severe PAD (ABI<0.7). Amongst those with PAD, 24/55 (43.64%) reported claudication by the ECQ. Correlates of PAD included female sex (AOR 2.25, 95% CI 1.06 - 4.77, p=0.034), current high blood pressure (AOR 2.59, 95% CI 1.25-5.33, p=0.01), and being on a sulfonylurea–glibenclamide (AOR 3.47, 95% CI 1.55 - 7.76, p=0.002). PAD was common in diabetic patients in southwestern Uganda. Given its low cost and ease of measurement, ABI deserves further assessment as a screening tool for both PAD and long term cardiovascular risk amongst diabetics in this region.

Ashok Khurana : 2013 A study to determine the prevalence of peripheral arterial disease in type 2 diabetes mellitus using the ankle-brachial pressure index and to educate the patients regarding risk factor modification and importance of early intervention to prevent future progression was conducted. A 12 MHz Doppler probe was used in the arms and legs to assess the ankle brachial index (ABI) in 200 type 2 diabetes mellitus patients aged more than 40 years. A thorough history of patients including age, smoking history, history of symptoms of peripheral arterial disease, complete physical examination, and routine investigations were collected at the time of enrolment for all subjects. A ratio of the highest blood pressure from the posterior tibial or pedal arteries of each leg to the highest blood pressure from the brachial arteries < 0.9 was considered abnormal. Abnormal ABIs were found in 33% (66/200) patients with type 2 diabetes mellitus. 45.5% patients had ABI 0.80 - 0.89, 33.3% patients had ABI 0.50 - 0.79, and 21.2% patients had ABI < 0.5. Prevalence of peripheral vascular disease in type 2 diabetes mellitus is on rise in northern India.

Williams: 2012 A study was conducted to evaluate the relative influences of noncritical lower limb arterial disease and peripheral neuropathy on cutaneous foot perfusion in diabetes. Toe-brachial pressure indices, transcutaneous oxygen, and carbon dioxide tensions at foot and chest sites were measured in individuals with diabetes, with or without detectable peripheral neuropathy and with or without significant arterial disease on color duplex imaging. Subjects without diabetes, with and without arterial disease, were used as controls. A total of 130 limbs were studied during an 8-month period. Toe-brachial pressure indices reflected the presence of arterial disease in all groups. Foot transcutaneous oxygen values were reduced in diabetes and correlated with chest transcutaneous oxygen values. Low foot transcutaneous oxygen with elevated transcutaneous carbon dioxide values were only

demonstrated in individuals with diabetes, arterial disease, and peripheral neuropathy. Toe-brachial pressure indices demonstrated a positive correlation with foot transcutaneous oxygen values, but values >1.2 demonstrated a negative correlation. The study results demonstrated that in diabetic individuals without critical limb ischemia, impaired foot perfusion secondary to arterial disease is amplified significantly by coexisting microcirculatory disease.

Bhavana Sosale: 2012 A observational, cross sectional study was conducted to screen for asymptomatic PAD using ankle brachial index (ABI) in order to characterize and compare risk factors associated with it and to look for the presence of ischemic heart disease (IHD) in rural and urban populations. This was an observational, cross-sectional study involving type 2 diabetic patients attending the diabetes clinic in an urban and rural hospital, in South India. Two hundred rural (R) and 400 urban (U) patients were screened for PAD over a period of1 year. An ABI ≤0.9 or >1.3 was considered abnormal. Risk factors were analyzed and *P* values and odds ratio (OR) were calculated. 17.8% of patients had an ABI suggestive of PAD (R 20% vs U 16.8%). 63.6% were male. Known risk factors of PAD were identified and included dyslipidemia (85%; R 92.5% vs U 80.6%; OR 1.61), obesity (84.1%; R 85% vs U 83.6%; OR 0.75), hypertension (59.8%; R 47.5% vs U 67.2%; OR 1.26), and age >50 years (64.5%; R 55% vs U 70%; OR1.24). Except for smoking (22.4%; R 32.5% vs U 16.4%; OR 1.03), none of the other risk factors were different between groups. Mean duration of type 2 diabetes mellitus (T2DM) was 7.95±7.50 (R 4.66±5.22 vs U 9.61±7.93; *P*<0.001). Electrocardiogram (ECG) changes consistent with IHD were found in 25.3% of patients with PAD. This study demonstrates that one in six asymptomatic South Indians with T2DM have PAD. One in four patients with PAD had ECG changes of IHD which was statistically significant. Based on the odds ratio,

the rural patients with PAD had two and a half times higher risk of IHD, even though there was no statistically significant difference in cardiovascular risk factors, age, sex, and mean hemoglobin A1c (HbA1c) in both groups.

Michel M. Joosten: 2012 A prospective study to estimate the degree to which the 4 conventional cardiovascular risk factors of smoking, hypertension, hypercholesterolemia, and type 2 diabetes are associated with the risk of PAD among men was undertaken. A prospective study of 44, 985 men in the United States without a history of cardiovascular disease at baseline in 1986; participants in the Health Professionals Follow-up Study were followed up for 25 years until January 2011. The presence of risk factors was updated biennially during follow-up. Clinically significant PAD defined as limb amputation or revascularization, angiogram reporting vascular obstruction of 50% or greater, ankle-brachial index of less than 0.90, or physician-diagnosed PAD. During a median follow-up of 24.2 years (interquartile range, 20.8-24.7 years), there were 537 cases of incident PAD. Each risk factor was significantly and independently associated with a higher risk of PAD after adjustment for the other 3 risk factors and confounders. The multivariable-adjusted hazard ratio for each additional risk factor was 2.06 (95% CI, 1.88-2.26). Men without any of the 4 risk factors had a hazard ratio of PAD of 0.23 (95% CI, 0.14-0.36) compared with all other men in the cohort. In 96% of PAD cases (95% CI, 94%-98%), at least 1 of the 4 risk factors was present at the time of PAD diagnosis. The population-attributable risk associated with these 4 risk factors was 75% (95% CI, 64%-87%). The absolute incidence of PAD among men with all 4 risk factors was 3.5/1000 person-years. Among men in this cohort, smoking, hypertension, hypercholesterolemia, and type 2 diabetes account for the majority of risk associated with development of clinically significant PAD.

Dong wang: 2012 A descriptive cross sectional study was undertaken to determine the prevalence and associated clinical factors of PAD in adult ambulatory diabetic patients attending the outpatient diabetic clinic of Mulago national referral and teaching hospital, Kampala Uganda. In this study 146 ambulatory adult diabetic patients were studied. Measurement of ankle brachial index (ABI) to assess for PAD, defined as a ratio less than 0.9 was performed using a portable 5–10 MHz Doppler device. The mean age/standard deviation of the study participants was 53.9/12.4 years with a male predominance (75, 51.4%). PAD was prevalent in 57 (39%) study participants. Of these, 34 (59.6%) had symptomatic PAD. The noted clinical factors associated with PAD in this study population were presence of symptoms of intermittent claudication and microalbuminuria. This study documents a high prevalence of PAD among adult ambulatory Ugandan diabetic patients.

Nancy C. Dolan: 2012 A cross sectional study to assess the lower extremity function and dysfunction in peripheral artery disease (PAD) patients with and without diabetes was conducted. In this study, 460 men and women with PAD (147 with diabetes) were recruited from three academic medical centers. Assessments included ankle brachial index (ABI), neuropathy score, 6-min walk distance, 4-m walking velocity, Walking Impairment Questionnaire (0–100 scale, 100 = best), and summary performance score (SPS) (0–12 scale, 12 = best). The mean ABI was similar in PAD patients with and without diabetes. PAD patients with diabetes were younger, had a higher BMI, had a worse neuropathy score, and had a greater number of cardiovascular comorbidities compared with those without diabetes. Participants with diabetes were less likely to report classical symptoms of intermittent claudication and more likely to report exertional leg pain, which sometimes started at rest. After adjusting for age, those with diabetes had a shorter mean 6-min walk distance (1,040

vs. 1,168 feet, $P < 0.001$), slower fast-pace 4-m walk velocity (0.83 vs. 0.90 m/sec, $P < 0.001$), and a lower SPS (7.3 vs. 8.6, $P < 0.001$) than those without diabetes. Patients with diet-controlled diabetes performed better than those on diabetes medications. Differences in lower extremity functioning between patients with and without diabetes were largely attenuated but not abolished for SPS and fast-pace 4-m walk velocity after adjustment for type of exertional leg pain, neuropathy score, and number of cardiovascular comorbidities. Subjects with PAD and diabetes have poorer lower extremity function than those with PAD alone.

Tavintharan: 2011 A study to describe the prevalence and risk factors for PAD in Asian Malays with diabetes was done. A population-based study of 3,280 (78.7% response) Malay persons aged 40—80 years in Singapore was conducted. ABI was measured in all participants with a history of diabetes (N=634). PAD was defined to be present if ABI ≤ 0.9. All participants had standardised interviews, clinical examinations and laboratory investigation for risk factor assessment. The crude prevalence of PAD was 10.4% (95% CI: 8.3%—13.0%). After age standardisation to the 2000 Singapore Census population, the prevalence was 5% (95% CI: 3.8—8.6). In multivariate analyses, the presence of PAD was associated with older age (OR 1.05; 95% CI: 1.01—1.09, per year increase), female gender (OR 4.18; 95% CI: 1.67—10.43), cigarette smoking (OR 2.55; 95% CI: 1.05—6.20), higher systolic blood pressure (OR 1.28; 95% CI: 1.13—1.45), a history of myocardial infarction (OR 3.69; 95% CI: 1.79—7.61) and stroke (OR 3.06 95% CI: 1.25—7.50). In this Asian Malay population with diabetes, a high prevalence of PAD was found the major risk factors for PAD among persons with diabetes are similar to studies in Caucasian populations, suggesting that strategies aimed at controlling the modifiable factors may reduce the prevalence of PAD in Asian populations.

Sharon L.Eason: 2010 A cross sectional study to describe coexisting medical conditions and lifestyle factors associated with asymptomatic peripheral arterial disease (PAD) in a population of white, African American, and Hispanic patients was done. White, African American, and Hispanic patients 50 years or older were recruited for this cross-sectional study from 4 primary care clinics in Houston, Texas. Patients with an ankle-brachial index (ABI) < 0.9 and without leg symptoms typical of PAD were diagnosed with asymptomatic PAD. 403 patients were screened for PAD. Of these, 25 (6.2%) had asymptomatic PAD. Compared with patients without PAD, diabetes mellitus ([OR] 3.8; 95% CI 1.6, 9.0) and a history of smoking at least 1 pack of cigarettes per day ([OR] 2.5; 95% CI 1.1, 6.0) were significantly associated with asymptomatic PAD. An interaction effect existed between diabetes mellitus and smoking at least 1 pack of cigarettes per day. Diabetes mellitus combined with heavy smoking showed the highest predicted value positive (15%) and the highest specificity (92%). A lack of both demonstrated low rates for predicting Asymptomatic PAD. The ankle-brachial index could become routine screening among patients with diabetes mellitus and/or who smoke.

Section- B: Studies related to peripheral vascular disease among Hypertension.

Andrew Makin: 2014 A study to assess that Peripheral vascular disease (PVD) is associated with a high cardiovascular morbidity and mortality was undertaken in City Hospital, Brimingham. Intermittent claudication is the most common symptomatic manifestation of PVD, but is also an important predictor of cardiovascular death, increasing it by three-fold, and increasing all-cause mortality by two to five-fold. Hypertension is a common and important risk factor for vascular disorders, including PVD. Of hypertensives at presentation, about 2-5% have intermittent claudication, with this prevalence increasing with age. Similarly, 35-55%

of patients with PVD at presentation also have hypertension. In a large study, 35% of 1011 patients with PVD had hypertension at presentation and importantly, having both hypertension and PVD produced an odds ratio of 1.48 (P=0.0056) for subsequent cardiovascular events. This study showed that deaths from all causes were more frequent in patients with an ankle/brachial pressure ratio below 0.8. This observation was also confirmed in the SHEP (Systolic Hypertension in the Elderly Programme) study where a low ankle arm index (less than 0.9) in an older population as well as hypertension predicted a two to three-fold increased risk of cardiovascular mortality. Patients who suffer from hypertension with PVD have a greatly increased risk of myocardial infarction and stroke. There is therefore an obvious need for such outcome studies, especially since the two conditions are commonly encountered together.

P E Korhonen : 2014 A study was performed to investigate whether resistant hypertension differs from uncontrolled and controlled hypertension in terms of target organ damage. Hypertensive subjects with antihypertensive medication (*n*=385) were identified in a population survey conducted in southwestern Finland. None of the study subjects had previously diagnosed cardiovascular or renal disease or diabetes. Ankle-brachial index, estimated glomerular filtration rate, electrocardiogram-determined left ventricular hypertrophy and cardiometabolic risk factors were assessed. The prevalence of peripheral arterial disease among subjects with resistant, uncontrolled and controlled hypertension was 6/37 (16%), 22/275 (8%) and 0/73 (0%), respectively (*P*=0.006). There were no differences in the prevalence of renal insufficiency, left ventricular hypertrophy or metabolic parameters between the groups. Resistant hypertension affects vasculature more than uncontrolled hypertension, and thus it can be regarded as a marker of more severe disease.

Zheng. L: 2013 A cross sectional study was conducted to estimate the prevalence of and risk factors for PAD in Chinese hypertensive patients with and without known cardiovascular disease (CVD). A study consisting of 5,186 hypertensive patients was conducted from July to November 2004 in Beijing and Shanghai, China. PAD was defined as an ankle-brachial index < or = 0.90 in either leg. The prevalence of PAD was 29.0% among hypertensive patients with known CVD, higher than in patients without known CVD (16.6%, P <0.0001). After multivariable logistic regression analysis, older age and current smoking were independently associated with prevalent PAD among all hypertensive patients.Among hypertensive patients without known CVD, higher total cholesterol (OR and 95% CI: 1.518, 1.162-1.984 in men and 1.460, 1.097-1.944 in women), was independently associated with prevalent PAD. Higher fasting glucose (OR and 95% CI: 1.027, 1.001-1.054 in men and 1.033, 1.006-1.061 in women) and higher uric acid (OR and 95% CI: 1.002, 1.001-1.003 in men and 1.003, 1.001-1.005 in women) were risk factors for PAD among hypertensive patients with known CVD. No association was found between obesity and PAD in hypertensive patients with and without known CVD.

Charles: 2013 This study aims to find the prevalence of peripheral artery disease in adult hypertensive subjects in Nnewi, Nigeria. The study was carried out among adult hypertensive subjects in the medical outpatient clinics and the medical wards of the NnamdiAzikiwe University Teaching Hospital, Nnewi. Two-hundred and fifty subjects were recruited between August 2004 and December 2004 for this study. The Rose Intermittent Claudication Questionnaire was administered and the Ankle-Brachial Index (ABI) was assessed with a hand-held Doppler device. The mean age of the study subjects was 58.9±8.9 years. They comprises106 (42.5%)

males and 144 (57.6%) females. The overall prevalence of PAD was 24.8% in the total study group. The ratio of asymptomatic to symptomatic subjects was 3.4:1. Hypertensive subjects with diabetes mellitus had a slightly higher prevalence rate (26%), compared to those with hypertension only (24%). The prevalence of PAD was much higher in patients above 55 years (30.7%) than in those below 55 years of age (15.5%). Peripheral artery disease is common, though largely asymptomatic in Nigerian hypertensive subjects. More efforts at screening and unmasking subjects are required.

XiaoMin Yang: 2012 A cross sectional study to investigate the prevalence of PAD and its risk factors in China, this study was carried out. Peripheral arterial disease (PAD) is associated with morbidity and mortality of coronary heart disease and stroke. Hypertension is an independent risk factor for peripheral arterial disease. A total of 4716 patients with hypertension and 833 age-gender matched people without hypertension were recruited; age 40 to 75 years, from seven rural communities. PAD was defined as an ankle-brachial index (ABI) ≤ 0.9 in either leg; hypertension was defined as systolic blood pressure $\geq$140 mm Hg, diastolic blood pressure $\geq$90 mm Hg, or history of antihypertensive drug use. The prevalence of PAD is 8.7% (n = 408) in patients with hypertension (n = 4716), higher than in people without hypertension (5.0%, n = 833, $P = .004$). Hypertensive patients with PAD were older, (61 ± 8.6 vs 58 ± 8.6, $P < .01$), had more conventional cardiovascular risk factors including systolic blood pressure (170 ± 22.6 vs 167 ± 22.7, $P < .01$), pulse pressure (72 ± 19.7 vs 68 ± 18.9, $P < .01$), blood glucose (5.8 ± 2.2 vs 5.6 ± 1.7, $P < .05$), total cholesterol (5.7 ± 1.3 vs 5.5 ± 1.1, $P < .05$), and serum uric acid (355 ± 98.0 vs 293 ± 86.2, $P < .05$) than the hypertensive patients without PAD. This study reports, for the first time, the prevalence of PAD in Chinese patients with

hypertension, which is quite different from that in westerners, and that PAD is independently associated with conventional cardiovascular risk factors.

Y Y Luo : 2012 A cohort study was conducted to evaluate the risk factors of peripheral arterial disease (PAD) and the relationship between ankle brachial index (ABI) and mortality from all-cause and cardiovascular disease (CVD) in Chinese patients with hypertension. The ABI cohort Study was designed to investigate risk factors of PAD and the relationship between ABI and mortality from all-cause and CVD in Chinese patients. ABI was identified at baseline by measuring systolic pressure at bilateral brachial and tibial arteries. Mortality surveillance was completed from November 2005 to January 2006. Among 3047 participants with hypertension at baseline, 839 (27.5%) were in the low-ABI group. Older age, female gender, higher serum level of triglycerides, lower serum level of high-density lipoprotein, a history of diabetes and a history of smoking were associated with low ABI. During the 13-month follow-up, there were 252 deaths, of which 100 died of CVD. Low ABI was associated with mortality from all-cause and CVD, whose adjusted relative risk was 1.619 (95% confidence interval 1.190–2.203) and 2.454 (1.531–3.933), respectively, in Cox regression models. The survival rate was significantly lower in the low-ABI group than in the normal-ABI group. This study demonstrated that low ABI was independently associated with a high risk of all-cause and CVD mortality in Chinese patients with hypertension. ABI should be promoted as an ideal tool to predict mortality in diabetic patients.

Raphael Monteiro: 2012 A cross sectional study was conducted to identify risk factors related to a low ABI in the elderly using two different methods of ABI calculation (traditional and modified definition using lower instead of higher ankle pressure). Peripheral arterial disease (PAD) increases with age and ankle-brachial

index (ABI) ≤ 0.9 is a noninvasive marker of PAD. A cross-sectional study was carried out with 65 hypertensive patients aged 65 years or older. PAD was present in 18% of individuals by current ABI definition and in 32% by modified method. Diabetes, cardiovascular diseases, metabolic syndrome, higher levels of systolic blood pressure and pulse pressure, elevated risk by Framingham Risk Score (FRS), and a higher number of total and antihypertensive drugs in use were associated with low ABI by both definitions. Smoking and LDL-cholesterol were associated with low ABI only by the modified definition. Low ABI by the modified definition detected 9 new cases of PAD but cardiovascular risk had not been considered high in 3 patients when calculated by FRS. In conclusion, given that a simple modification of ABI calculation would be able to identify more patients at high risk, it should be considered for cardiovascular risk prediction in all elderly hypertensive outpatients.

Section- C: Studies related to effectiveness of Buerger Allen Exercise on lower extremity perfusion

Chyong- Fang Chang: 2015 A study was done to assess systematic review and evidence for the effectiveness of Buerger's exercise on the peripheral circulation or diabetic foot ulceration. A systematic search and 18 electronic databases were conducted. The intervention was predominantly focused on Buerger's exercise as an outcome. Due to high heterogeneity, data were synthesized in a narrative format rather than by statistical methods. Nine studies that covered 592 participants were selected in the analysis, of which 8 of the 9 found an effect of Buerger's exercise on peripheral circulation. The positive effects were indicative of improving blood flow, walking ability, reducing necrosis, reducing venous embolism, pain, swelling, cyanosis and the bed-rest times. However, the study design and quality appraisal were limited to Jadad score 2 and the sample size was small. Most of the studies (N = 8)

reported a positive effect of Buerger's exercises. More than half of the studies indicated significantly improved blood flow of the lower extremities and walking ability ($p < 0.05$), decreased hemorheology indices after operation ($p < 0.05$), reduced bed-rest times ($p < 0.05$). Six studies indicated that the exercises significantly reducing swelling, cyanosis and pain ($p < 0.001$), reduced venous embolism ($p < 0.001$), and delayed the occurrence of foot ulcers and gangrene. Findings provide some evidence of the beneficial effects of Buerger's exercises. It was seen as a low cost and low risk physical activity that most diabetic patients could undertake at home. This review highlighted a need for further investigation of standardized procedures of Buerger's exercises. More high quality studies on the prevention of diabetic foot are required regarding Buerger's exercises.

Jency John: 2015 A study was undertaken to investigate the level of lower extremity perfusion among patient with type 2 diabetes and assess the effect of Buerger Allen Exercise to improve lower extremity perfusion among patients with type 2 Diabetes Mellitus admitted at Chettinad Hospital and Research Institute, Chennai, India. Non equivalent pre test post test control group design was followed to conduct the present study; divided 60 patients with type 2 diabetes mellitus were grouped in to two groups. Subjects in experimental group underwent intervention of buerger allen exercise under supervision for 2 times a day for 5 days and in control group, subjects were under regular treatment. Demographic data and ankle brachial index scale was used to assess the lower extremity blood circulation. In experimental and control group 24(80%), 15 (50%) had lower extremity arterial disease and 6(20%), 15 (50%) were in border line. In experimental group there was a significant difference between the pre-test mean value 0.922 with SD 0.0562 and post test mean value 0.980 with SD .0407 which projects that t value 9.108* was significant at the

level of p< 0.05. The findings of the present study revealed that there is a significant improvement in the lower extremity perfusion after doing Buerger Allen exercise.

Aruna : 2015 A experimental study was to determine the effectiveness of Allen Buerger Exercises among people with Type II Diabetes Mellitus by using Ankle –Brachial Index at Kuthambakkam village, Thiruvallur district of Tamil nadu, India. Diabetes mellitus increases the risk of lower extremity peripheral arterial disease by 2 to 4 times and is present in 12% to 20% of persons with lower extremity peripheral arterial disease. The risk of developing lower extremity peripheral arterial disease is proportional to the severity and duration of diabetes and 7- to 15-fold more likely to undergo a major amputation is also greater in diabetics than non diabetics. Experimental Research Design with 30 samples in experimental group and 30 samples in control group were selected by using random sampling technique. In experimental group there was a significant difference between the pre-test mean value 0.824 with SD 0.0652 and post test mean value 0.960 with SD .0508 which projects that t value 10.108*. Peripheral arterial disease and the effectiveness of Allen Buerger exercise was assessed by Ankle Brachial index Scale. The findings of the study revealed that there is a significant improvement in Ankle-Brachial index Score in preventing peripheral arterial disease among people with Diabetes Mellitus in experimental group after receiving Allen Buerger exercise at the level of Peripheral Arterial Disease.

Tota Kawasaki: 2013 A study to assess the effect of Buerger Allen Exercise on lower limbs skin perfusion pressure was conducted. The subjects of this study were 10 healthy adults and 11 patients with critical limb ischemia. Patients with critical limb ischemia, including both dorsum of foot and plantar of foot, having SPP of lower limbs of less than 40 mmHg (supine position) were the object of this study. SPP was

measured on four positions (supine position, lower limbs elevation position, sitting position, and reclining bed elevation of 20° position). In sitting position, both the number of healthy adults and critical patients show significant increases in SPP compared with the other three positions. Findings were statistically significant differences in all groups **p<0.01, *p<0.05. These results suggest that sitting position is effective to keep good blood stream of lower limbs not only in healthy adults but also in patients with critical limb ischemia.

Balaji Nujella : 2013 A study was undertaken to assess the effectiveness of Compressive stockings with Buerger's exercise provide the required pressure and thereby improve the circulation peripherally in PVD patients at Sangareddy, Andra Pradesh. The study was carried out between both the modalities to know the efficacy of one over the other. A sample of 40 individuals randomly divided into two groups, Group A and Group B, consisting 20 patients each (n=20), was involved in the study. At the end of study, statistical significance was achieved for compressive stockings over electrical stimulations in improving the maximal walking distance (MWD) in peripheral vascular disease patients. Inclusion and exclusion criteria along with the accepted clinical procedures were followed for methodology and tests for conducting the study. The MWD and the level of pain on Visual Analog Scale (VAS) were used as the objective and subjective outcome measures, respectively. The statistical significance using the t-test was achieved to be P<0.05 (value of $t$at 5% significance and 38 degrees of freedom for the mean was 2.021) for both the outcome measures after calculating their means and standard deviations.

Sherin Hassan: 2012 A study was to compare between Allen-Burger exercises alone or combined with treadmill walking exercises on posterior tibial artery diameter, walking distance and economy. Sixty male patients suffering from

intermittent claudication as a result of diabetic atherosclerosis participated in this study. Patients were randomly assigned into three groups; group (A) received Allen-Burger exercises and treadmill walking exercises, group (B) received Allen-Burger exercises, and group (C) received medical treatment. Maximal walking distance and pain free walking distance, walking economy and posterior tibia artery diameter were measured pre and post the three months period for all groups. Findings of pain free walking distance group A&B mean difference 33.05 at p=0.0001, group A&C MD 172.15 at p=0.0001, group B&C MD 139.1 at p=0.0001. All measured parameters were improved in all groups with the greatest improvement been in group (A) and the least improvement in group (C) except for posterior tibial artery diameter that was improved in group (A) and (B).

Lowrence H. Wisham: 2010 A quasi-experimental pre-post-test design study was undertaken to established a standardized procedure for Buerger Allen exercise combined with a health-promoting program and investigated its effectiveness in reducing peripheral neurovasculopathy among rural Taiwanese residents with type 2 diabetes who were at high risk of developing DFU. Peripheral neuropathy and vasculopathy are important risk factors for diabetic foot ulceration (DFU). The Buerger exercise protocol comprised of a 3-step posture change with 9 minutes for each cycle. Outcome measurements included the ankle brachial pressure index (ABI), Michigan neuropathy screening instrument (MNSI), blood pressure, frequency of self-reported leg discomfort, and a type 2 Diabetes Health Promotion Score. Thirty-one patients at high risk of developing DFU completed this study. The statistical significance using the *t*-test was achieved to be $P<0.05$ (value of *t*at 5% significance and 38 degrees of freedom for the mean was 2.02). Buerger exercise combined with a health-promoting program significantly improved (1) the ABI in both legs, (2) health-

promoting behaviors, (3) MNSI values, and (4) leg discomfort symptoms. The findings support the use of Berger exercises combined with a health-promoting program to improve symptoms of diabetic peripheral neuropathy and peripheral circulation.

SUMMARY

This chapter included the review of literature in three sub-sections, namely Risk for peripheral vascular disease among Diabetes Mellitus, Risk for peripheral vascular disease among Hypertension and Effectiveness of Buerger Allen Exercise on levels of lower extremity perfusion.

CHAPTER-III

METHODOLOGY

Methodology refers to the techniques used to structure a study and to gather and analyze information in a systematic fashion. –**Polit& Beck (2013).**

This chapter deals with the research approach, research design, description of variables, setting, population, sample, sampling technique, sample size, criteria for sample selection, development of the tool and data collection procedure. The present study aimed to evaluate the effectiveness of Buerger Allen Exercise on levels of lower extremity perfusion among patients with selected NCDs.

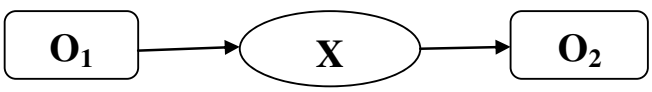
RESEARCH APPROACH

A quantitative research approach was adopted for the present study to accomplish the objective of evaluate the effectiveness of Buerger Allen Exercise on levels of lower extremity perfusion among patients with selected NCDs.

RESEARCH DESIGN

The research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure **(Polit&Hungler2012).**

To evaluate the effectiveness of Buerger Allen Exercise on levels of lower extremity perfusion, the investigator used a pre-experimental, one group pre test - post test design.



Key:

O_1 (Pre test) – an assessment the levels of lower extremity perfusion among patients with selected NCDs before Buerger Allen Exercise.

X – Intervention of Buerger Allen Exercise.

O_2 (Post test) - an assessment the levels of lower extremity perfusion among patients with selected NCDs after the Buerger Allen Exercise.

SETTING

The study was conducted in Medical and Special wards at Sri Narayani Hospital and Research Centre, Sripuram, Vellore. The setting was chosen on the basis of feasibility and availability of adequate samples.

POPULATION

Population denotes the entire group of subjects under study **(Sharma.k.2011).**

The target population for the present study was patients with selected NCDs who are admitted in Sri Narayani Hospital and Research Centre, Vellore.

SAMPLE

The sample is the subset of a population selected to participate in the research study. **(Polit&Hungler2012)**.

The sample of the present study comprised of 40 Patients with Diabetes Mellitus and/or Hypertension admitted at Sri Narayani Hospital and Research Centre, Vellore.

SAMPLING TECHNIQUE

The process of selecting a portion of the population to represent the entire population is known as sampling technique. **(Patricia2012).**

A Non Probability, Purposive sampling technique was used for the present study.

SAMPLE SIZE

40 patients with selected NCDs were selected based on the inclusion and exclusion criteria.

CRITERIA FOR SAMPLE SELECTION:

INCLUSION CRITERIA: Patients with,

- Diabetes Mellitus and/or Hypertension
- ABI Scale score < 1
- Both Male and Female
- Aged above 30 years

EXCLUSION CRITERIA: Patients who are,

- unconscious
- disoriented
- critically ill patients
- on anti coagulant therapy
- on treatment deep vein thrombosis
- not willing to participate.

VARIABLES:

- ✓ **Independent Variables** : Buerger Allen Exercise
- ✓ **Dependent Variables** : Lower extremity perfusion
- ✓ **Demographic Variables** : Age, Gender, Education, Occupation, Type of Job, Habits, Diet pattern, Body Mass Index, Type of NCDs, Duration of illness.

DATA COLLECTION METHOD AND TOOL:

Selection of the tool

Based on the objectives of the study, standardized tool and checklist was used to assess the level of lower extremity perfusion. The tool was divided into two sections –Section A and Section B.

Section – A Demographic profile

This section consists of Ten items pertinent to patients with selected NCDs such as age, gender, education, occupation, type of work, diet pattern, BMI, habits, type of NCDs, duration of illness.

Section – B Levels of lower extremity perfusion

Part-I: Levels of Lower extremity perfusion is assessed by Ankle Brachial Index Scale.

Assessment of lower extremity perfusion using Ankle Brachial Index Scale is done by standard manual sphygmomanometer and standard hand held Doppler, where the score is interpreted as >1- normal, 1.0-0.8- mild, 0.8-0.5- moderate level of peripheral arterial disease, less than 0.5 severe level of Peripheral arterial disease.

Part-II: Check list for selected clinical features of PVD.

The checklist developed by the researcher consists of parameters like Peripheral pulse, Capillary refill, Odema, Temperature, Pain, Skin colour. Scoring of items was done with standard revised venous clinical severity score. 0-4- normal, 5-9- mild, 10-14- moderate, and 15-18-severe level symptoms of peripheral vascular disease.

INTERVENTION

Buerger Allen Exercise is one of the intervention to stimulate the development of collateral circulation in the legs. In this exercise there are three steps.

Step 1 – Elevation

The lower extremities are elevated to 45 degree angle and supported in this position until the skin blanches (3 minutes).

Step 2 – Dependency

The feet and legs are then lowered below the level of the rest of the body until redness appears (10 minutes).

Step 3 – Horizontal

The legs are placed flat on the bed for 10 minutes.

The Buerger Allen Exercise is given to the patients two times per day with 6 hours interval for the period of 5 days.

PILOT STUDY

A pilot study is defined as a small - scale version or trial run of the major study. **(J.Sharma2013).**

After obtaining permission from the concerned authority, the pilot study was conducted from 13.07.2015 to 17.07.2015 in Sri Narayani Hospital and Research Centre, Sri puram, Vellore. Pre test was conducted on 13.07.15 and the same day the Buerger Allen Exercise is demonstrated by researcher and it was return demonstrated by the patients two times per day with 6 hours interval for the period of 5 days. On 5^{th} day 17.07.15 post test was conducted.

The pilot study helps to find the reliability and validity of the tool. The pilot study concluded that it was feasible to conduct the main study.

RELIABILITY

Reliability is defined as the extent to which the instrument yields the same results on repeated measure, concerned with consistency, accuracy, stability and homogenecity. The Ankle Brachial Index Scale and Check list was administered to 5 patients with selected NCDs, by test and retest method to obtain the reliability of the tool. Since the ABI co-efficient correlation r= 1, the tool was found highly reliable and checklist co-efficient correlation r=0.99, the tool was found to be highly reliable.

VALIDITY

Validity is the most critical criterion and indicates the degree to which an instrument measures what it is supposed to measure. **(Polit&Beck2013).**

The content validity of the tool was obtained from several experts in the field of Medical and Surgical Nursing, Statistics, and General medicine. Initially section A consisted of 15 demographic variables, out of which 10 variables had 100% validity, 5 items were removed from the demographic variables. In section B part I standardized tool ABI scale is used to assess the lower extremity perfusion, part II- checklist is used to assess the symptoms of PVD as prepared by researcher. In section B the total items were increased from 5 to 6, based on the expert opinion necessary changes were made in the section B.

DATA COLLECTION

- Approved from head of the research committee members and written permission from head of institution to conduct the research at Sri Narayani Hospital and Research Centre, Vellore was obtained.
- The main study was conducted from 20.7.15 to 24.8.15. The patients with diabetes mellitus and/or hypertension were informed regarding the research study and informed consent was obtained initially.
- Buerger Allen Exercise was demonstrated by researcher and it was return demonstrated by the patients under researcher's supervision.
- Three steps of active postural exercise that includes elevation- 3 minutes, dependency- 10 minutes, and horizontal- 10 minutes.
- Patients had Buerger Allen Exercise two times per day with 6 hours interval for the period of 5 days under the supervision of the researcher. After 5 days of Buerger Allen exercise program , levels of lower extremity perfusion were assessed.

PLAN FOR DATA ANALYSIS

Descriptive statistics are useful for summarizing empirical information. Inferential statistics which is based on laws of probability provide a means for drawing conclusions about the population from which data is obtained for sample.

The collected data will be analyzed using descriptive and inferential statistics using the following steps:

Descriptive Statistics:

- Frequency and Percentage distribution is used to analyze the selected demographic variables.
- Mean and standard deviation is used to assess the levels of lower extremity perfusion.

Inferential Statistics:

- Paired 't' test is used to assess the effectiveness of Buerger Allen Exercise on levels of lower extremity perfusion.
- 'Chi' square is used to assess the association between post test scores of lower extremity perfusion and selected demographic variables.

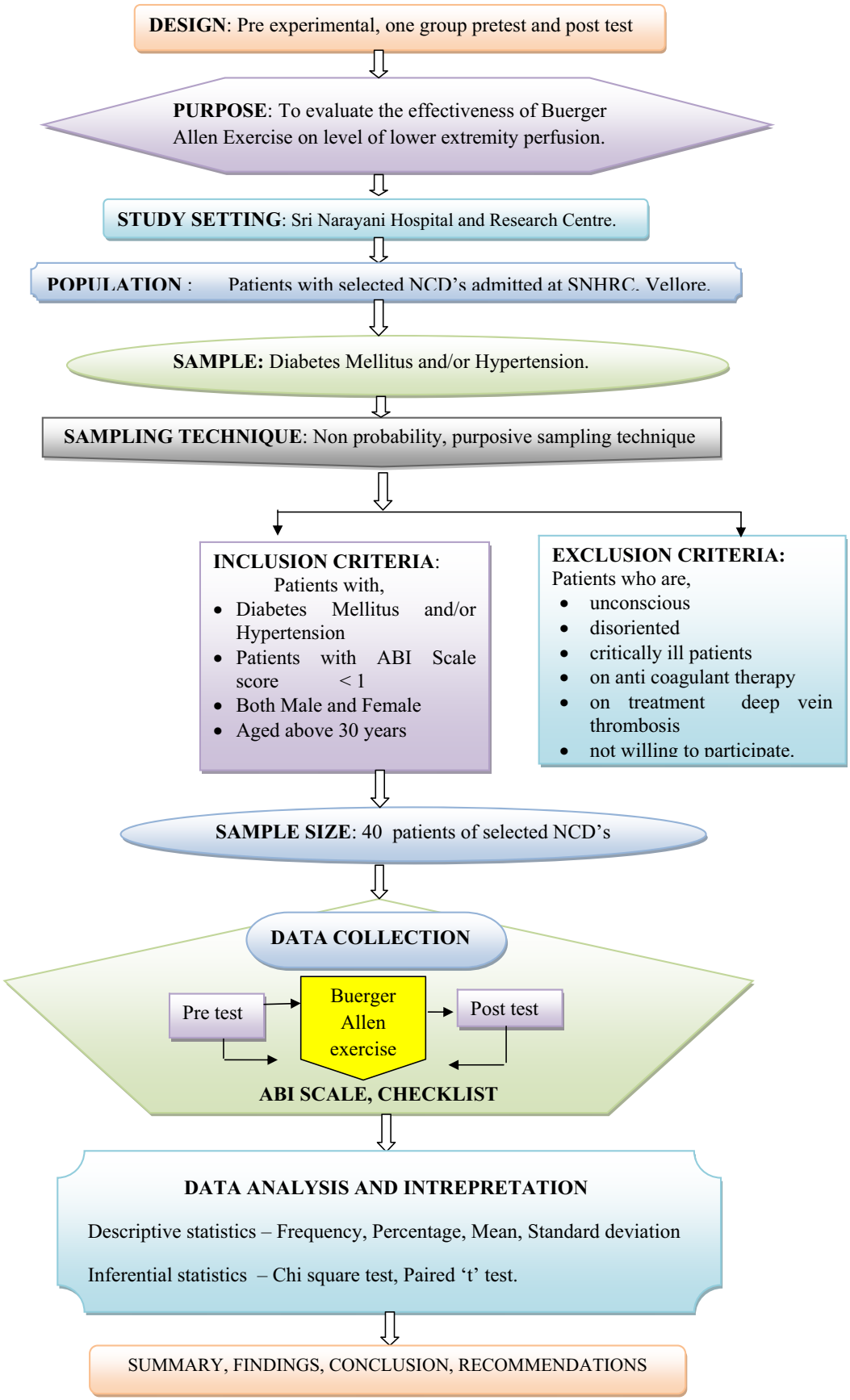


Figure: 2. Schematic Representation of Research Methodology

CHAPTER IV

DATA ANALYSIS AND INTERPRETATION

This chapter deals with the analysis and interpretation of the data collected to determine the effectiveness of Buerger Allen Exercise on levels of lower extremity perfusion among patients with selected NCDs admitted at Sri Narayani Hospital and Research Centre, Vellore.

Analysis is the categorizing, ordering, and summarizing of the data to obtain answers to the research questions. The purpose of analysis is to reduce data to an intelligible and interpretable form so that the relations to research problems can be studied and tested (**Geri Lobiondo 2010**).

Data were processed and analyzed on the basis of the objectives and hypotheses. The data were tabulated, analyzed and interpreted using descriptive and inferential statistics.

ORGANIZATION OF DATA

As per the objectives of the study, the interpretation has been organized and tabulated as follows:

Section I: Distribution of demographic variables of patients with selected NCDs admitted at SNHRC.

Section II: Frequency and Percentage distribution of pre and post test levels of lower extremity perfusion scores among patients with selected NCDs.

Section III: Effectiveness of Buerger Allen Exercise on levels of lower extremity perfusion among patients with selected NCDs.

Section IV: Analysis of association between the post test levels of lower extremity perfusion among patients with selected NCDs.

SECTION: I

Distribution of demographic variables of patients with selected NCDs admitted at SNHRC, Vellore.

Table 1: Frequency and Percentage distribution of patients with selected NCDs according to Age (in years). n=40

AGE (in years)	FREQUENCY	PERCENTAGE (%)
31-40	04	10.0
41-50	11	27.5
51-60	13	32.5
Above 60	12	30.0

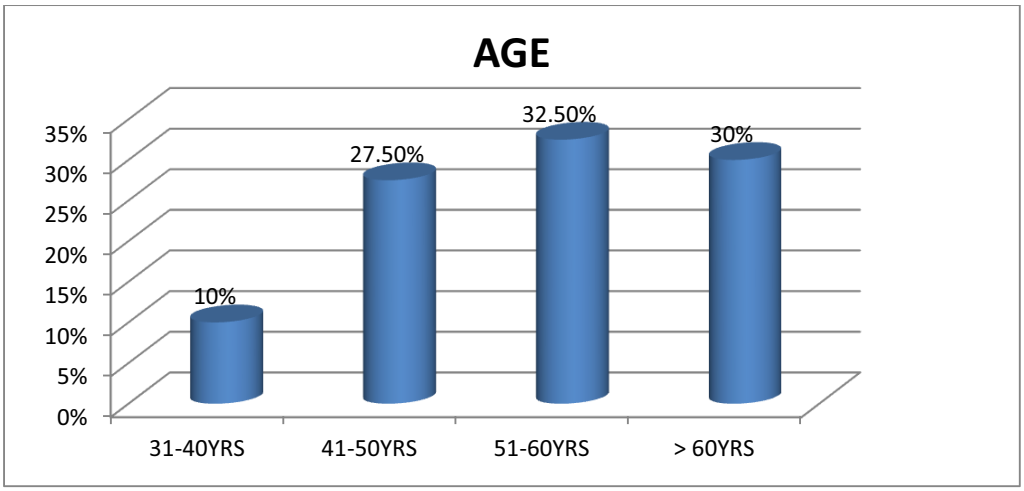


Figure 3: Cylindrical graph shows percentage distribution of patients with selected NCDs according to Age (in years).

The table 1 and Figure 3 depicts that the most of the patients 13 (32.5%) were between the age group of 51-60 years, 12 (30%) between the age group of above 60 years, 11 (27.5%) between the age group of 41-50 years and 4 (10%) was in the age group of 31-40 years.

Table 2: Frequency and Percentage distribution of patients with selected NCDs according to the gender. n=40

SEX	FREQUENCY	PERCENTAGE(%)
Male	19	47.5
Female	21	52.5
Others	0	0

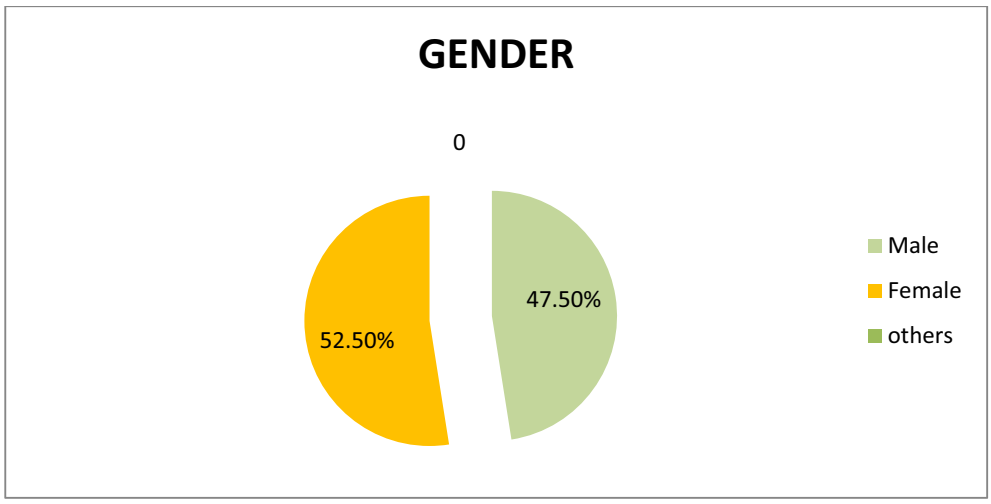


Figure 4 Pie chart shows percentage distribution of patients with selected NCDs according to Gender.

The above table 2 and Figure 4 reveals that majority of the patients 21 (52.5%) were Females, 19 (47.5%) were males.

Table 3: Frequency and Percentage distribution of patients with selected NCDs based on Education. n=40

EDUCATION	FREQUENCY	PERCENTAGE (%)
Illiterate	10	25
Primary education	18	45
Secondary education	08	20
Graduate	04	10
Post Graduate and above	0	0

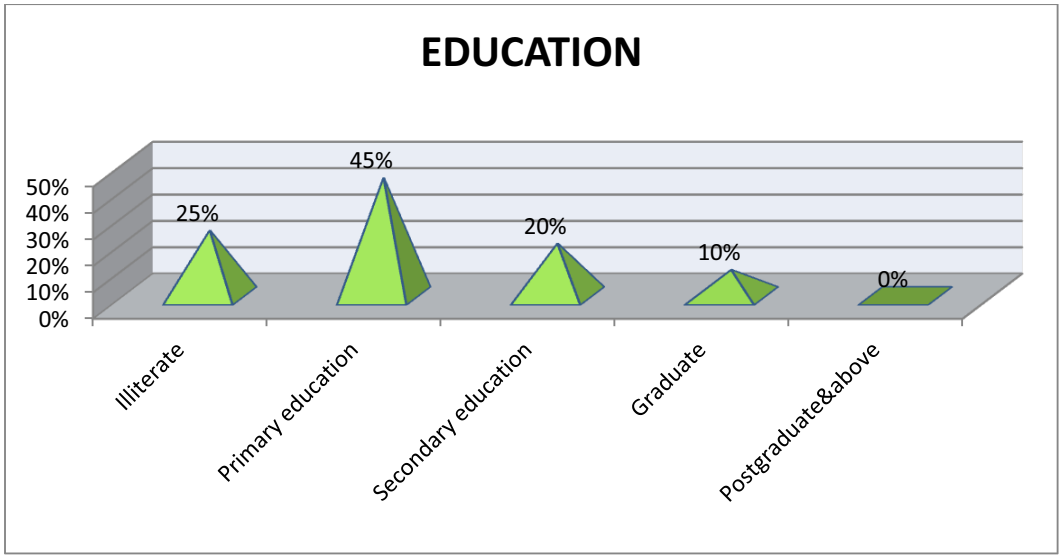


Figure 5: Cone graph shows percentage distribution of patients with selected NCDs according to Education.

The above table 3 and Figure 5 shows that 10(25%) of patients were illiterate, 18(45%) were studied in Primary education, 8(20%) studied in Secondary education, 4(10%) completed the Graduation and No one studied upto Post graduate.

Table 4: Frequency and Percentage distribution of patients with selected NCDs according to Occupation. n=40

OCCUPATION	FREQUENCY	PERCENTAGE (%)
Homemaker	16	40.0
Unemployed	03	7.5
Unskilled laborer	07	17.5
Skilled laborer	10	25.0
Professional	04	10

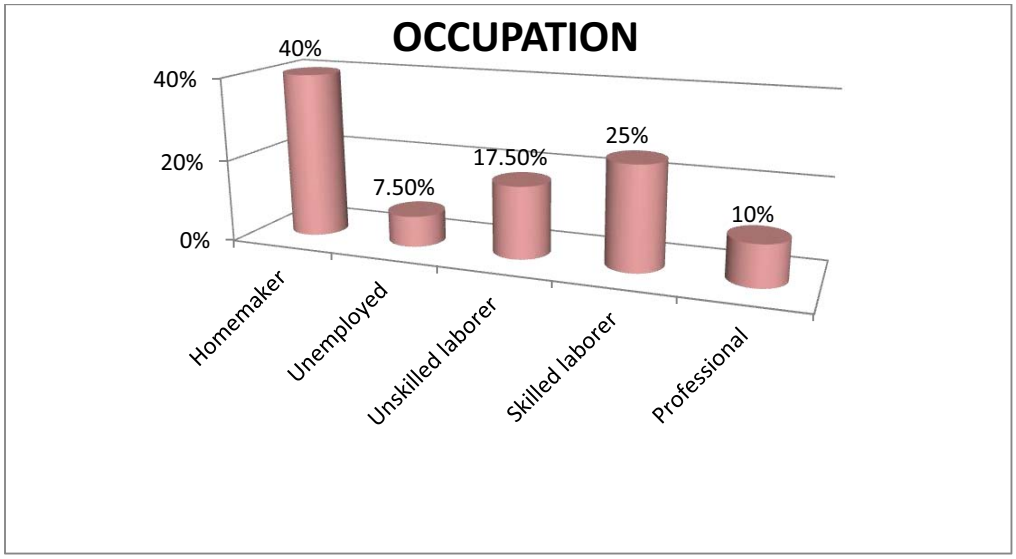


Figure 6: Column chart shows percentage distribution of patients with selected NCDs according to Occupation.

The above table 4 and Figure 6 depicts that most of the patients 16 (40%) were Homemakers, 10 (25%) belonged to skilled laborer, 7 (17.5%) belonged to unskilled laborer and 4(10%) belonged to professional and only 3(7.5%) were Unemployed.

Table 5: Frequency and Percentage distribution of patients with selected NCDs according to Type of work. n=40

TYPE OF WORK	FREQUENCY	PERCENTAGE (%)
Sedentary work	22	55%
Moderate work	12	30%
Heavy work	06	15%

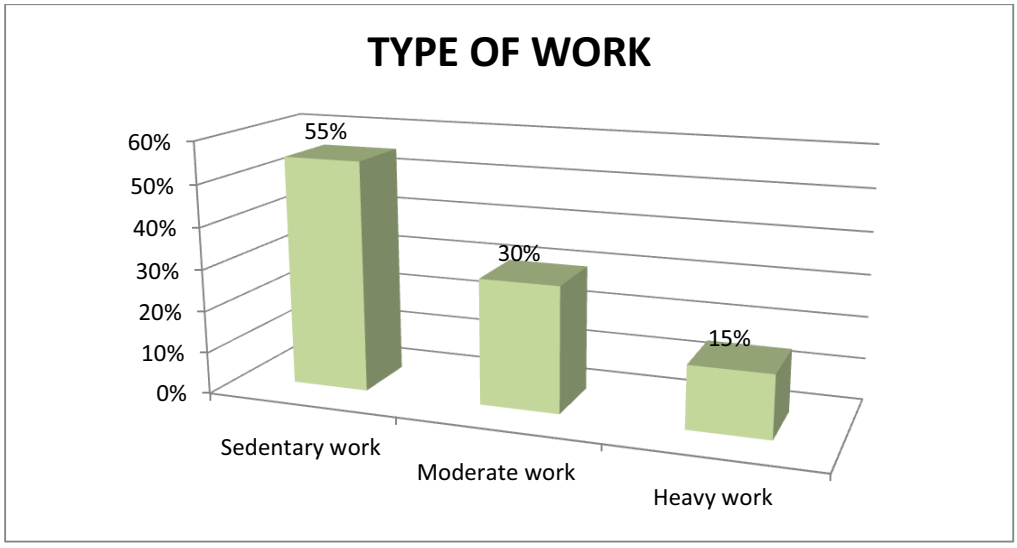


Figure 7: Bar graph shows percentage distribution of patients with selected NCDs according to Type of work.

The above table 5 and Figure 7 describes that 22 (55%) of patients were Sedentary worker, 12(30%) were moderate worker, 6(15%) belong to heavy worker.

Table 6: Frequency and Percentage distribution of patients with selected NCDs according to Diet pattern. n=40

DIET PATTERN	FREQUENCY	PERCENTAGE (%)
Vegetarian	6	15
Mixed	34	85

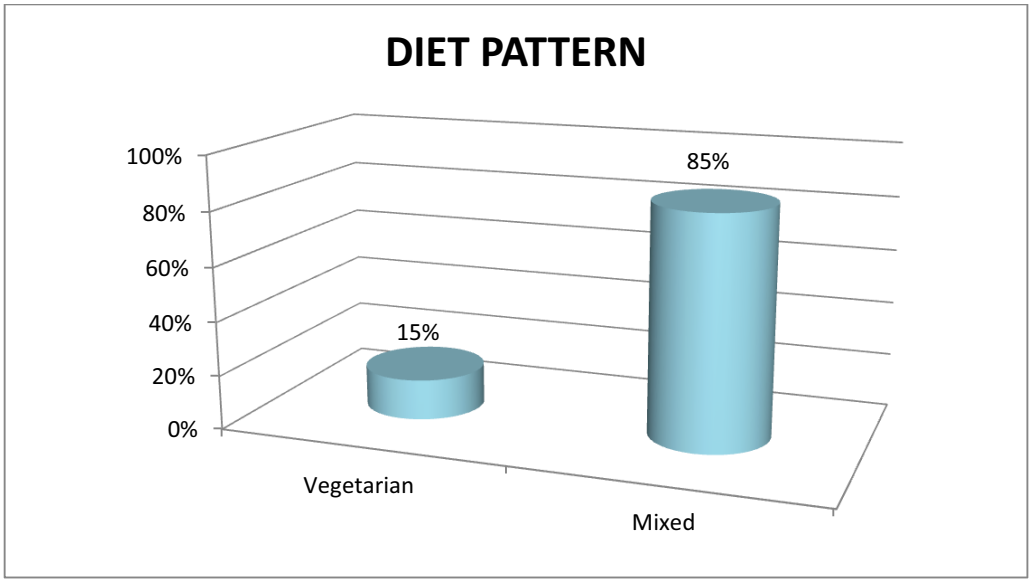


Figure 8: Cylindrical graph shows percentage distribution of patients with selected NCDs according to Diet pattern.

The above table 6 and Figure 8 depicts that 6(15%) patients were vegetarian and majority of the patients 34(85%) belong to a mixed diet pattern.

Table 7: Frequency and Percentage distribution of patients with selected NCDs according to BMI. n = 40

BMI	FREQUENCY	PERCENTAGE (%)
Below 18	0	0
Between 19-24	17	42.5
Between 25-30	19	47.5
Above 30	4	10

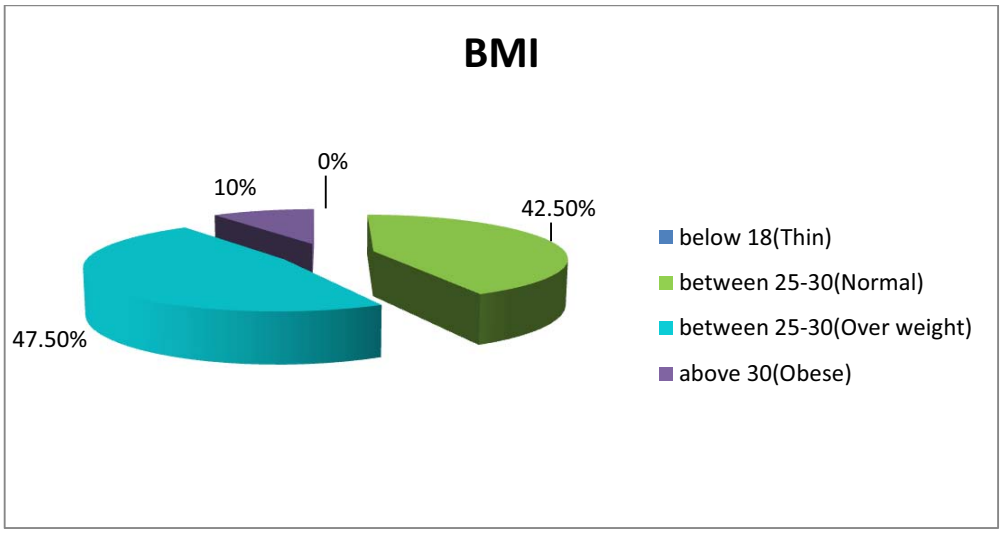


Figure 9: Pie graph shows percentage distribution of patients with selected NCDs according to BMI.

The above table 7 and Figure 9 represents that majority of the patients 19(47.5%) had the BMI between 25-30, 17(42.5%) had between 19-24, and 4(10%) had above 30.

Table 8: Frequency and Percentage distribution of patients with selected NCDs according to Habits. n=40

HABITS	FREQUENCY	PERCENTAGE (%)
Smoking	5	12.5
Alcohol	2	5
Both	9	22.5
Others	0	0
No ill habits	24	60

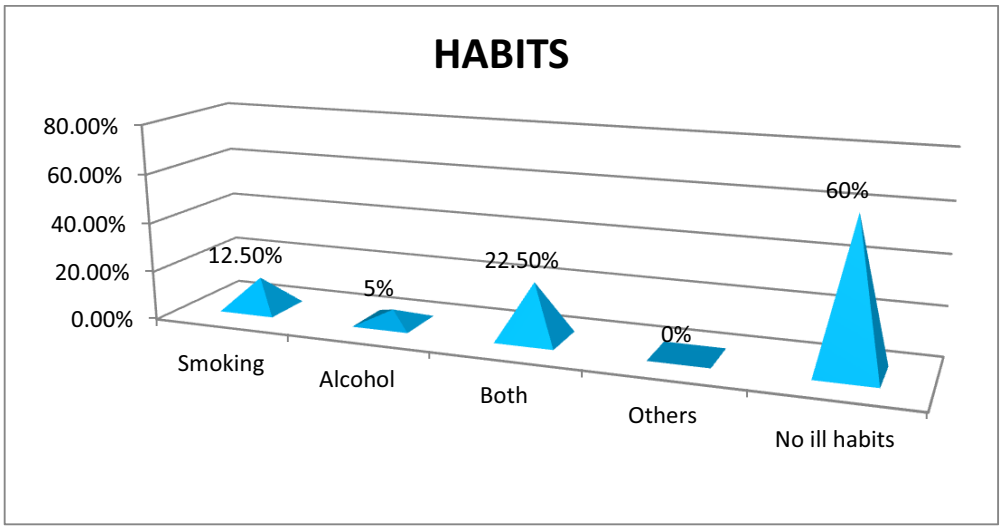


Figure 10: Cone chart shows percentage distribution of patients with selected NCDs according to Habits.

The data presented in the above table 8 and Figure 10 depicts that majority of patients 24(60%) did not have any ill habits, 9(22.5%) were smoker and alcohol abusers, 5(12.5%) had only smoking habits and 2(5%) were alcohol abusers only.

Table 9: Frequency and Percentage distribution of patients with selected NCDs according to Type of NCDs. n=40

TYPE OF NCDs	FREQUENCY	PERCENTAGE (%)
Diabetes Mellitus	15	37.5
Hypertension	9	22.5
Both 1.1 & 1.2	16	40

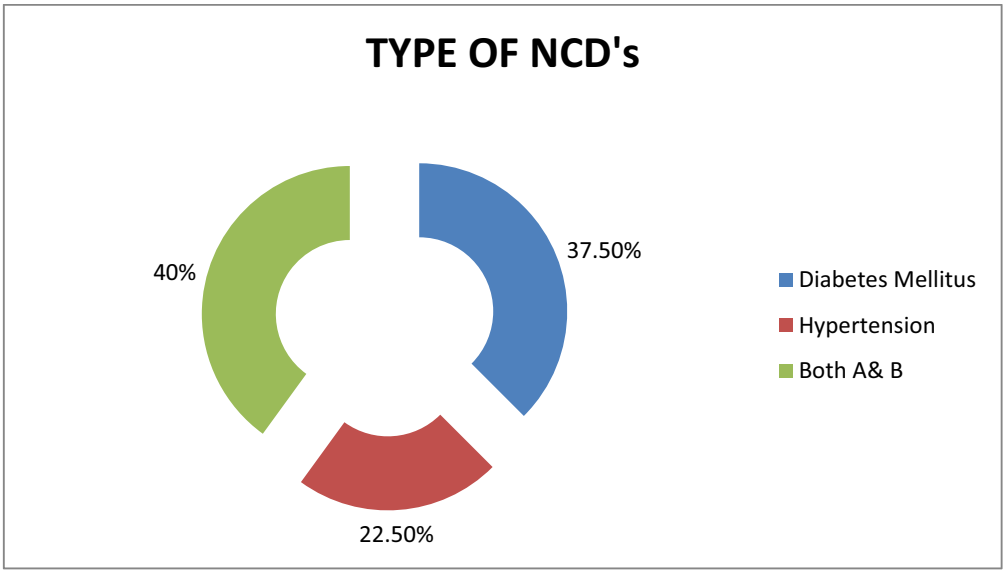


Figure 11: Doughnut chart shows percentage distribution of patients with selected NCDs according to Type of NCDs.

The above table 9 and Figure 11 depicts that most of the patients 16(40%) diagnosed as Both Diabetes and Hypertension, 15 (37.5%) diagnosed as Diabetes mellitus and 9(22.5%) diagnosed as having Hypertension.

Table 10: Frequency and Percentage distribution of patients with selected NCDs according to Duration of Illness.

n=40

DURATION OF ILLNESS	FREQUENCY	PERCENTAGE(%)
< 5 yrs	2	5%
6-10 yrs	10	25%
11-15 yrs	11	27.5%
> 15 yrs	17	42.5%

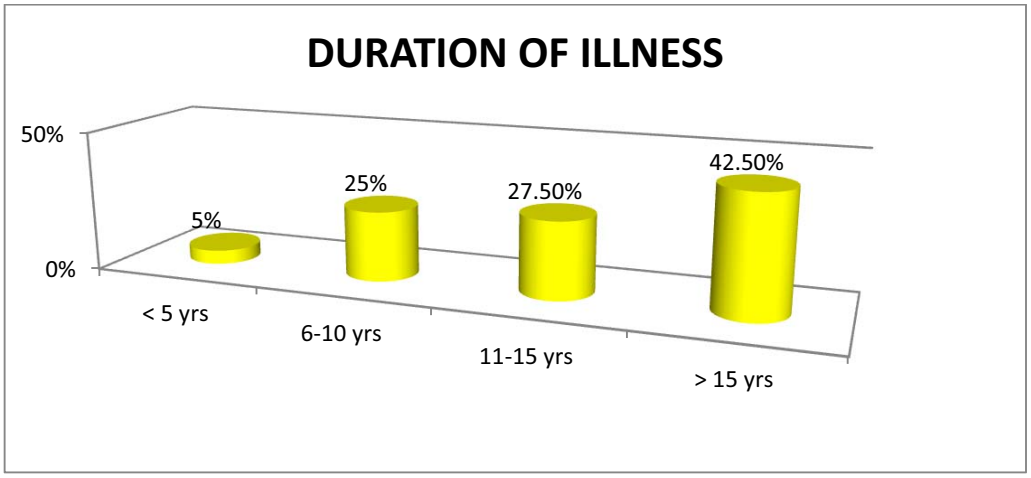


Figure 12: Cylindrical graph shows percentage distribution of patients with selected NCDs according to Duration of Illness.

The above table 10 and Figure 12 shows that according to duration of illness most of the patients 17(42.5%) have been diagnosed 15years before, 11(27.5%) have been diagnosed 11-15 years ago, 10(25%) were diagnosed 6-10 years earlier and 2(5%) have been diagnosed before 5 years.

SECTION-II

Frequency & Percentage distribution of pre & post test levels of lower extremity perfusion

Table 11: Frequency & Percentage distribution of pre and post test levels of lower extremity perfusion among patients with selected NCDs measured by ABI.

n=40

S.NO	LEVEL OF LOWER EXTREMITY PERFUSION	PRE TEST		POST TEST	
		NO	%	NO	%
1.	Normal	0	0	5	12.5%
2.	Mild	18	45%	23	57.5%
3.	Moderate	22	55%	12	30%
4.	Severe	0	0%	0	0
	Total	40	100%	40	100%

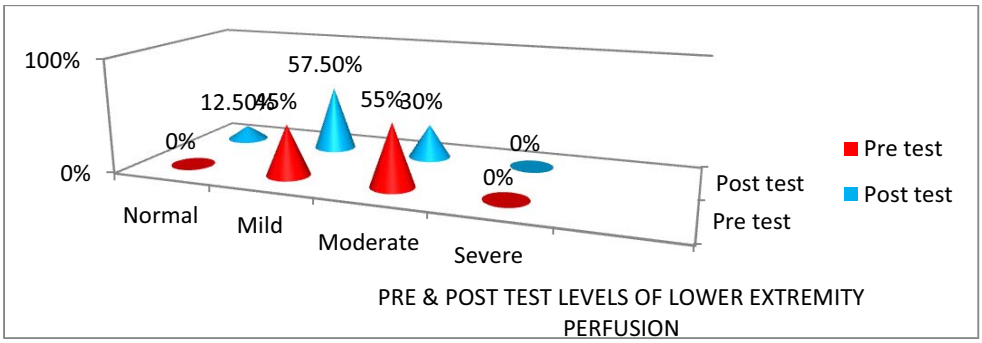


Figure 13: Percentage distribution of pre and post test score of lower extremity perfusion.

The Table 11 and Figure 13 describes that before the intervention of Buerger Allen Exercise 18(45%) patients had a mild level of PVD, 22(55%) had a moderate level of PVD and none of them had a severe level of PVD. After the Buerger Allen Exercise 5(12.5%) patients had a normal level of lower extremity perfusion, 23(57.5%) had a mild level of PVD, 12(30%) had a moderate level of PVD.

Table 12: Frequency & percentage of pre and post test scores of selected clinical features assessed by Checklist among patients with selected NCDs. n=40

S.NO	LEVEL OF CLINICAL FEATURES	PRE TEST		POST TEST	
		NO	%	NO	%
1.	Normal	0	0	9	22.5%
2.	Mild	18	45%	21	52.5%
3.	Moderate	17	42.5%	10	25%
4.	Severe	5	12.5%	0	0
	Total	40	100%	40	100%

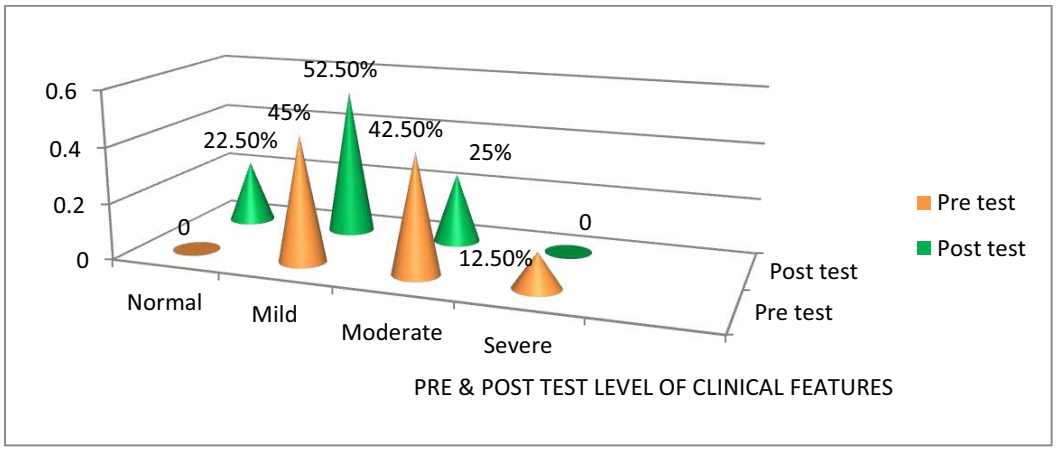


Figure 14: Percentage distribution of pre and post test score of selected clinical features of PVD.

The Table 12 and Figure 14 describes that before the intervention of Buerger Allen Exercise the patients 18(45%) had mild, 17(42.5%) had moderate and 5(12.5%) had severe level of symptoms(Oedema, Pain, Temperature, Capillary refill, Skin colour, Peripheral pulse). After the Buerger Allen Exercise 9(22.5%) had normal, 21(52.5%) had mild, 10(25%) had a moderate level of symptoms and None of them had severe level of symptoms.

SECTION III

Effectiveness Of Buerger Allen Exercise on levels of Lower Extremity Perfusion.

Table 13: Comparison of ABI pre and post test mean scores on levels of lower extremity perfusion among patients with selected NCDs. n= 40

S.No.	Lower extremity perfusion	Mean	Standard Deviation	Mean difference	Paired t test
1.	Pre test	0.77	0.089	0.111	14.13 *
2.	Post test	0.88	0.077		

Note *statistically significant (p<0.05)

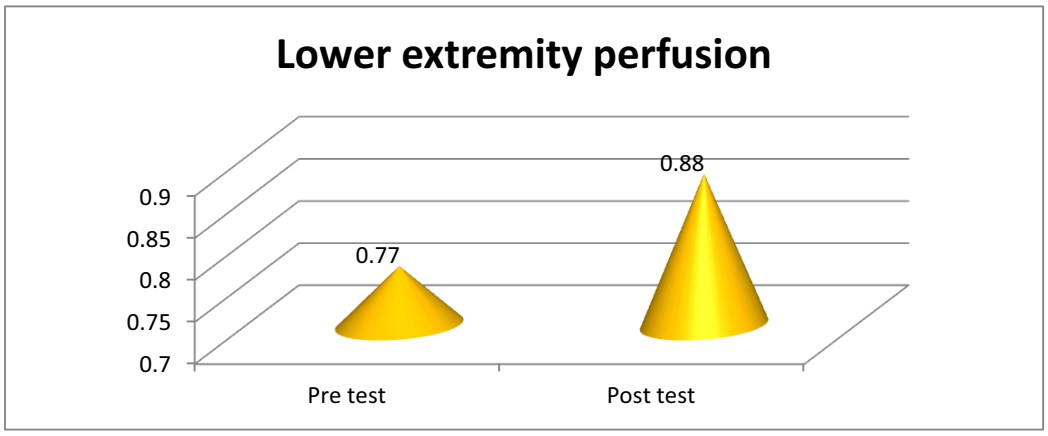


Figure 15: Cone chart showing the effectiveness of Buerger Allen Exercise for Pre test and Post test scores on Lower Extremity Perfusion.

The above table 13 and Figure 15 shows that pre test mean value is 0.77. After practicing Buerger Allen Exercise the post test mean value is 0.88. The‘t’ value (14.13*) is greater than that of the table value (2.021). This shows that Buerger Allen Exercise is effective in improving lower extremity perfusion among patients with selected NCDs. Hence the hypothesis H_1 is accepted.

Table 14: Comparison of checklist pre and post test mean scores on level of clinical features among patients with selected NCDs.

n=40

S.No.	Level of Clinical Features	Mean	Standard Deviation	Mean difference	Paired "t" test
1.	Pre test	11.6	3.3	3.15	21.4 *
2.	Post test	8.45	3.1		

Note *statistically significant (p<0.05)

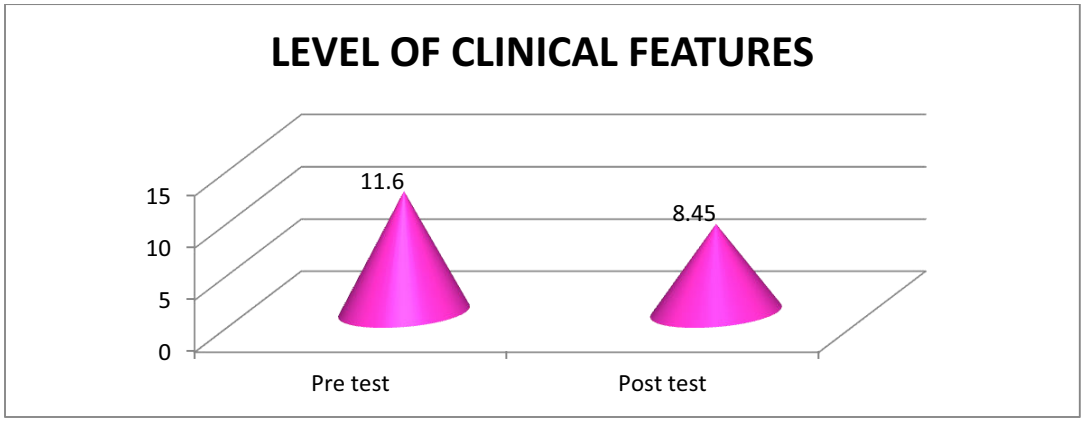


Figure 16: Cone chart showing the effectiveness of Buerger Allen Exercise for Pre and Post test scores on level of clinical features.

The above table 14 and Figure 16 show that check list for selected clinical features of pre test mean value is 11.6. After practicing exercise the post test mean value is 8.45. The 't' value (21.4*) is greater than that of the table value (2.021). This shows that Buerger Allen Exercise is effective in improving lower extremity perfusion among patients with selected NCDs. Hence the hypothesis H_1 is accepted.

SECTION – IV

Analysis of association between post test levels of lower extremity perfusion and selected demographic variables.

Table 15: Association Between post test scores of lower extremity perfusion and Selected demographic variables based on ABI. n=40

Demographic variables	Sample(n)		Lower extremity perfusion								'Chi' square x^2 value
	No	%	>1		0.8-1		0.5-0.8		<0.5		
			No	%	No	%	No	%	No	%	
1.Age(in years) 31-40yrs	4	10	1	25	3	75	-	-	-	-	2.5 df=9, NS
41-50yrs	11	27.5	2	18.5	6	54	3	27.5	-	-	
51-60yrs	13	32.5	2	15	7	54	4	31	-	-	
above 60yrs	12	30	-	-	7	58	5	42	-	-	
2.Gender Male	19	47.5	2	11	10	53	7	36	-	-	3.5 df=6, NS
Female	21	52.5	3	14	13	62	5	24	-	-	
Others	0	0	-	-	-	-	-	-	-	-	
3.Education Illiterate	10	25	1	10	4	40	5	50	-	-	0.316 df=12, NS
Primary education	18	45	1	6	15	83	2	11	-	-	
Secondary education	8	20	2	24	3	38	3	38	-	-	
Graduate	4	10	1	25	1	25	2	50	-	-	
Postgraduate & above	0	0	-	-	-	-	-	-	-	-	
4.Occupation Homemaker	16	40	2	12	10	63	4	25	-	-	2.9 df=12, NS
Unemployed	3	7.5	0	-	1	34	2	66	-	-	
Unskilled laborer	7	17.5	2	28.5	2	28.5	3	43	-	-	

Demographic variables	Sample(n)		Lower extremity perfusion								'Chi' square x^2 value
	No	%	>1		0.8-1		0.5-0.8		<0.5		
			No	%	No	%	No	%	No	%	
Skilled laborer	10	25	1	10	7	70	2	20	-	-	
Professional	4	10	0	-	3	75	1	25	-	-	
5.Type of work											
Sedentary work	22	55	2	9	17	77	3	14	-	-	2.9 df=6, NS
Moderate work	12	30	3	25	4	33	5	42	-	-	
Heavy work	6	15	0	-	2	34	4	66	-	-	
6.Diet pattern											
Vegetarian	6	15	2	33	3	50	1	17	-	-	2.035 df=3, NS
Mixed	34	85	3	9	20	59	11	32	-	-	
7.BMI											
below 18	0	0	-	-	-	-	-	-	-	-	
between 19-24	17	42.5	1	6	11	65	5	29	-	-	2.9 df=9, NS
between 25-30	19	47.5	2	10	11	58	6	32	-	-	
above 30	4	10	2	50	1	25	1	25	-	-	
8.Habits											
Smoking	5	12.5	0	-	5	100	0	-	-	-	
Alcohol	2	5	1	50	0	-	1	50	-	-	2.035 df=12, NS
Both	9	22.5	0	-	3	33	6	67	-	-	
Others	0	0	-	-	-	-	-	-	-	-	
No ill habits	24	60	4	16	15	63	5	21	-	-	

Demographic variables	Sample(n)		Lower extremity perfusion								'Chi' square x^2 value
	No	%	>1		0.8-1		0.5-0.8		<5		
			No	%	No	%	No	%	No	%	
9.Type of NCDs											
Diabetes Mellitus	15	37.5	2	13	9	60	4	27	-	-	13.32 df=6, **S***
Hypertension	9	22.5	1	11	3	33	5	56	-	-	
Both A&B	16	40	2	12	11	69	3	19	-	-	
10.Duration of Illness											
< 5yrs	2	5	1	50	1	50	0	-	-	-	5.636 df=9 NS
6-10yrs	10	25	2	20	4	40	4	40	-	-	
11-15yrs	11	27.5	1	9	7	64	3	27	-	-	
> 15yrs	17	42.5	1	6	11	65	5	29	-	-	

Note : S = Significant (*=p<0.05), NS = Not significant

INTERPRETATION:

Table 15 represents the statistical outcome of 'Chi' square analysis. It was used to findout the association between post test score of lower extremity perfusion and selected demographic variables.

The 'Chi' –square value of Type of NCDs(Diabetes mellitus and/or Hypertension) is associated 13.32 and df=6 which is Significant at p<0.05 level and whereas demographic variables such as age, sex, education, occupation, type of work, diet pattern, BMI, habits, duration of illness are, Not Significant at p <0.05 level . Hence, it is interpreted that the selected demographic variables were only associated with posttest scores of lower extremity perfusion. So, hypothesis H_2 was accepted.

Table 16: Association Between post test scores of lower extremity perfusion and Selected demographic variables based on checklist for selected clinical features of PVD. n=40

Demographic variables	Sample(n)		Lower extremity perfusion								'Chi' square x^2 value
	No	%	0-4		5-9		10-14		15-18		
			No	%	No	%	No	%	No	%	
1.Age(in years)											13.5 df=9, **S***
31-40yrs	4	10	1	25	3	75	0	-	-	-	
41-50yrs	11	27.5	2	18.5	4	36	5	45.5	-	-	
51-60yrs	13	32.5	3	23.5	9	69	1	7.5	-	-	
above 60yrs	12	30	3	25	5	42	4	33	-	-	
2.Gender											1.315 df=6, NS
Male	19	47.5	3	15.5	13	68	3	15.5	-	-	
Female	21	52.5	6	28.5	8	38	7	33.5	-	-	
Others	0	0	-	-	-	-	-	-	-	-	
3.Education											4.96 df=12, NS
Illiterate	10	25	3	30	4	40	3	30	-	-	
Primary education	18	45	2	11.5	14	77	2	11.5	-	-	
Secondary education	8	20	3	38	1	12	4	50	-	-	
Graduate	4	10	1	25	2	50	1	25	-	-	
Postgraduate & above	0	0	-	-	-	-	-	-	-	-	
4.Occupation											3.015 df=12, NS
Homemaker	16	40	3	18.5	10	63	3	18.5	-	-	
Unemployed	3	7.5	2	67	1	33	0	-	-	-	
Unskilled laborer	7	17.5	0	-	5	72	2	28	-	-	

Demographic variables	Samples(n)		Lower extremity perfusion								'Chi' square x^2 value
	No	%	0-4		5-9		10-14		15-18		
			No	%	No	%	No	%	No	%	
Skilled laborer	10	25	3	30	3	30	4	40	-	-	
Professional	4	10	1	25	2	50	1	25	-	-	
5.Type of work											
Sedentary work	22	55	5	22.5	15	68	2	9.5	-	-	2.7 df=6, NS
Moderate work	12	30	3	25	5	42	4	33	-	-	
Heavy work	6	15	1	16	1	16	4	68	-	-	
6.Diet pattern											
Vegetarian	6	15	4	67	2	33	0	-	-	-	2.46 df=3, NS
Mixed	34	85	5	15	19	56	10	29	-		
7.BMI											
below 18	0	0	-	-	-	-	-	-	-	-	14.65 df=9, S*
between 19-24	17	42.5	6	35	9	53	2	12	-	-	
between 25-30	19	47.5	3	16	11	58	5	26	-	-	
above 30	4	10	0	-	1	25	3	75	-	-	
8.Habits											
Smoking	5	12.5	1	20	2	40	2	40	-	-	
Alcohol	2	5	0	-	1	50	1	50	-	-	
Both	9	22.5	1	12	4	44	4	44	-	-	5.60 df=12, NS
Others	0	0	-	-	-	-	-	-	-	-	
No ill habits	24	60	7	29	14	58	3	13	-	-	

Demographic variables	Sample(n)		Lower extremity perfusion								'Chi' square x^2 value
	No	%	0-4		5-9		10-14		15-18		
			No	%	No	%	No	%	No	%	
9.Type of NCDs											10.3 df=6, NS
Diabetes Mellitus	15	37.5	5	33	7	47	3	20	-	-	
Hypertension	9	22.5	4	45	3	33	2	22	-	-	
Both A&B	16	40	0	-	11	69	5	31	-	-	
10.Duration of Illness											6.62 df=9 NS
< 5yrs	2	5	2	100	0	-	0	-	-	-	
6-10yrs	10	25	4	40	3	30	3	30	-	-	
11-15yrs	11	27.5	3	28	4	36	4	36	-	-	
> 15yrs	17	42.5	0	-	14	82	3	18	-	-	

Note : S = Significant *=p<0.05 NS = Not significant

INTERPRETATION:

Table 16 represents the statistical outcome of 'Chi' square analysis. It was used to find out the association between post test score of lower extremity perfusion and selected demographic variables.

The 'Chi' –square value of age is associated 13.5 at df=9 and BMI is associated 14.65 at df=9 which is Significant at p<0.05 level and whereas demographic variables such as gender, education, occupation, type of work, diet pattern, habits, duration of illness are, Not Significant at p <0.05 level .

Hence, it is interpreted that the selected demographic variables were only associated with posttest scores of lower extremity perfusion. So, hypothesis H_2 was accepted.

SUMMARY

This chapter dealt with the analysis and interpretation of data using descriptive and inferential statistics. The findings of the study indicated that the Buerger Allen Exercise was effective in improving lower extremity perfusion.

CHAPTER - V

DISCUSSION

The present study is designed to evaluate the effectiveness of Buerger Allen Exercise on levels of lower extremity perfusion among patients with selected NCDs admitted at Sri Narayani Hospital and Research Center, Vellore.

The research design used in the study was pre experimental, one group pre test- post test design. The tool consists of demographic variables, Ankle Brachial Index Scale and check list for selected clinical features of PVD to assess the Lower extremity perfusion. The main study was conducted from 20.07.15 to 24.08.15 on 40 patients admitted with selected NCDs who met the inclusion criteria, who were selected by purposive sampling technique. After the selection of sample, the level of lower extremity perfusion was assessed by using the Ankle Brachial Index Scale and Checklist for selected clinical features of PVD. Buerger Allen Exercise intervention was administered two times per day with 6 hours interval for the period of 5 days to the patients with selected NCDs. After 5 days of Buerger Allen Exercise, Post test was conducted on the samples using the Ankle Brachial Index Scale and Check list for selected clinical features of PVD. The descriptive statistics (frequency, percentage, mean, standard deviation) and inferential statistics ('Chi'-square, paired't' test) were used to analyze the data, and to test the study hypotheses.

The first objective of the study was to assess the levels of lower extremity perfusion before Buerger Allen Exercise among patients with selected NCDs.

The data identified from the present study shows that the pre test means scores of ABI is 0.77 and checklist pretest mean score is 10.5 and where it shows that level of lower extremity perfusion is low in patients with selected NCDs.

This study finding was supported by **Likhila Abraham: 2015** A study to assess the effectiveness of structured teaching programme on knowledge regarding varicose vein and practice of Buerger Allen Exercise in improving peripheral perfusion among workers in a Tile Factory at Mangalore. The investigator selected pre experimental one group pretest- post test design. Total samples consisted of 60 male workers based on simple random sampling technique was used to select the desired size of workers. The workers knowledge on varicose vein was assessed with interview method and perfusion of extremity was measured using check list. In this study the pretest mean score of peripheral perfusion was 18.33 and also 39(65%) had mild symptoms, 21(35%) had moderate symptoms of reduced perfusion.

Balaha M.H.et. al (2010) conducted a study on Effect of Buerger Exercise on lower extremity perfusion among 250 patients admitted in medical wards at King Faisal University Hospital, Saudi Arabia. ABI was used to diagnose PAD. PAD was diagnosed in 35.6% of cases, distributed as 45% mild, 32.6% moderate and 22.4% severe. So this study supports the present study. Where the researcher observed that the levels of lower extremity perfusion in patients with selected NCDs are low.

The second objective of the study was to assess the effectiveness of Buerger Allen Exercise on levels of lower extremity perfusion among patients with selected NCDs.

After the 5 days of Buerger Allen Exercise post test was conducted by using ABI Scale and Checklist. This study findings reveals that the post-test mean score ABI was 0.88, with standard deviation is 0.077 and post test mean score checklist was 7.15, with standard deviation is 2.6 and paired "t" value of ABI was 14.13 (Table value - 2.021) and checklist "t" value 21.4 (Table value – 2.021) was obtained, which is statistically significant at $p<0.05$ level. The data identified from the present study shows that the Buerger Allen Exercise on levels of lower extremity perfusion was effective among patients with selectd NCDs.

This study was supported by **Vijayabarathi: 2014** The study was aimed at evaluating the effectiveness of Buerger Allen exercise on wound healing process among Type 2 Diabetic foot ulcer patients. Quasi experimental pre – test post – test control design was adopted and Non probability purposive sampling technique was used to select the samples. A total of 60 Type 2 diabetes mellitus patient with foot ulcer has been taken from Rajiv Gandhi Government General Hospital, Chennai, and the Buerger Allen exercise was practiced for the selected samples. Condition of the foot ulcer was analyzed before and after the study. Collected data was analyzed using descriptive and inferential statistics. A high significant On an average, in experimental group, diabetic patients are having 24.6 % improved wound healing where as in control group, on an average, diabetic patients are having only 5.3 % wound healing.

Jissy Jacob(2013) Effectiveness of Buerger Allen Exercise on Peripheral Perfusion among patients with Type 2 Diabetes Mellitus in selected hospital, Bangalore. In this study also depicted that after the Buerger allen exercise in experimental group, the post test mean score of lower extremity perfusion among Type 2 DM was highest 2.40 (8.57%), which was improved than compared to the control group.

Priyanka Jayakumar (2014) a quasi experimental pre and post test control group design was used to evaluate the effectiveness of Buerger Allen Exercise in improving the peripheral circulation among clients with diabetes mellitus in selected hospitals at Bangalore. The findings of the study revealed that post test mean score was 6.18, with standard deviation is 2.2 and paired 't' value is 11.12, which is statistically significant at $p< 0.05$ level.

The third objective of the study was to associate the post test levels of lower extremity perfusion among patients with selected NCDs and demographic variables.

The 'Chi' square test was calculated to find out the association between post test score of lower extremity perfusion and selected demographic variables based on ABI. The results revealed that type of NCDs are statistically significant at 5% ($p<0.05$), whereas age, gender, education, occupation, type of work, diet pattern, habits, BMI, duration of illness are not statistically significant at $p<0.05$ level, the checklist "Chi"–square value of age, BMI are statistically significant at $p <0.05$ level and whereas demographic variables such as gender, education, occupation, type of work, diet pattern, habits, duration of illness are Not Significant at $p <0.05$ level .

Amany Edward Seedhom (2013) Effect of Limb Exercise on foot perfusion among patients with PVD in selected hospitals at China. In this study also found that 80.2% of the participants experienced reduced peripheral perfusion which was significantly associated with a age, family history of PAD, BMI, and smoking.

Pranitha (2010) conducted to determine the effectiveness of Buerger Allen Exercise on lower extremity perfusion. It concluded that the computed 'Chi'-square value showed that there was no association between pre-test peripheral perfusion with selected variables such as age, education, BMI and dietary pattern at $p<0.05$ level of significance.

This study was supported by **Nisha Ghimire (2013)** conducted to determine the effectiveness of Buerger allen exercises in improving peripheral perfusion among Type II diabetes mellitus patients admitted in selected hospitals at Mangalore. The study results shows that chi-square value of occupation, type of work are statistically significant at $p<0.05$ level.

SUMMARY

In this chapter the findings of the present study were analysed and discussed with findings of other similar studies.

CHAPTER-VI

SUMMARY AND RECOMMENDATION

This chapter presents the summary, major findings, conclusions, nursing implications and recommendations.

SUMMARY

The study was conducted to evaluate the effectiveness of Buerger Allen Exercise on level of lower extremity perfusion among patients with selected NCDs admitted at Sri Narayani Hospital and Research Centre, Vellore. Review of literature was under taken from primary and secondary sources that formed the basis of selection of problem, formation of tool and conceptual framework. The conceptual framework of this study was Daniel Stuffle Beam's 'CIPP Model' (1986).

The research design used in the study was pre experimental, one group pre test- post test design. The tool consists of demographic variables and Ankle Brachial Index Scale and check list to assess the Lower extremity perfusion. Five Experts validated the tool. Initially section A consisted of 15 demographic variables, out of which 10 variables had 100% validity, 5 items were removed from the demographic variables. In section B part I standardized tool ABI scale was used to assess the lower extremity perfusion, part II- checklist was used to assess the symptoms of PVD as prepared by researcher. In section B the total items were increased from 5 to 6, based on the expert opinion necessary changes were made in the section B.

The pilot study was conducted from 13th to 17th of July 2015 in Sri Narayani Hospital and Research Center, Sri puram, Vellore. The study was found to be feasible to proceed with the main study.

The main study was conducted from 20.07.15 to 24.08.15 on 40 patients admitted with selected NCDs who met the inclusion criteria and were selected by purposive sampling technique. After the selection of sample, the level of lower extremity perfusion was assessed by using the Ankle Brachial Index Scale and Checklist and then Buerger Allen Exercise intervention was administered two times per day with 6 hours interval for the period of 5 days to the patients with selected NCDs. After 5 days of Buerger Allen Exercise, Post test was conducted on the same samples using the same Ankle Brachial Index Scale and Check list. The descriptive statistics (frequency, percentage, mean, standard deviation) and inferential statistics (‘chi’-square, paired‘t’ test) were used to analyze the data, and to test the study hypotheses.

MAJOR FINDINGS OF THE STUDY

The study findings reveal that the pretest data analysis of Ankle Brachial Index Scale shows that 40 patients with selected NCDs 18(45%) had moderate Peripheral Vascular Disease and 22(55%) had mild peripheral vascular disease. After the Buerger Allen Exercise intervention the post test analysis of ABI Scale shows that 5(12.5%) had normal, 23 (57.5%) had mild and, 12 (30%) had moderate peripheral vascular disease. This shows that Buerger Allen Exercise was effective.

The pretest data analysis of Checklist shows that 40 patients with selected NCDs 18(45%) had mild symptoms of peripheral vascular disease, 17(42.5%) had moderate symptoms and 5(12.5%) had severe symptoms of peripheral vascular disease. After the Buerger Allen Exercise intervention the posttest analysis of checklist shows that 9(22.5%) had normal, 21(52.5%) had mild and 10(25%) had

moderate symptoms of peripheral vascular disease, none of them had severe level of symptoms. This proves that Buerger Allen Exercise was effective.

The overall pretest ABI mean score with the standard deviation was 0.77±0.089 and the post test ABI mean score with the standard deviation was 0.88± 0.077. The mean difference of pre and post test was 0.11. The calculated paired‘t’ value (t=14.14) was higher than the tabulated value (t=2.021) which is highly significant. Hence the hypothesis H_1 is accepted because difference between pre and post test level of lower extremity perfusion were true difference and thus it is interpreted the Buerger Allen Exercise was effective.

The overall pretest checklist for clinical features of PVD mean score with the standard deviation was 11±3.3 and the post test checklist mean score with the standard deviation was 8.45±3.1. The mean difference of pre and post test was 3.15. The calculated paired‘t’ value (t=21.4) was higher than the tabulated value (t=2.021) which is highly significant. Hence the hypothesis H_1 is accepted and it is accepted that difference between pre and post test level of lower extremity perfusion were true difference thus it is interpreted the Buerger Allen Exercise was effective.

The ‘Chi’ square test of ABI was calculated to find out the association between post test level of lower extremity perfusion and selected demographic variables. The results revealed that type of NCDs are statistically significant at 5% ($p<0.05$). Hence, it is interpreted that the difference in mean score was the true difference and whereas age, gender, education, occupation, type of work, diet pattern, BMI, habits, duration of illness are not statistically significant at $p<0.05$ level. Hence, it is interpreted that the difference in mean score value related to the demographic variables and not true and the hypothesis H_2 was accepted.

The 'Chi' square test checklist was calculated to find out the association between post test level of lower extremity perfusion and selected demographic variables. The results revealed that age, BMI are statistically significant at $p<0.05$ level. Hence, it is interpreted that the difference in mean score was the true difference and whereas gender, education, occupation, diet pattern, BMI, habits, duration of illness are not statistically significant at $p<0.05$ level. Hence, it is interpreted that the difference in mean score value related to the demographic variables and not true and the hypothesis H_2 was accepted.

CONCLUSION

The present study assessed the effectiveness of Buerger Allen Exercise on level of lower extremity perfusion among patients with selected NCDs admitted at Sri Narayani Hospital and Research Center, Vellore. The level of lower extremity perfusion was mild, moderate and severe before Buerger Allen Exercise. It was found that normal, mild, moderate peripheral vascular disease and none of them had severe PVD after administration of Buerger Allen Exercise. It is evident that the Buerger Allen Exercise is effective in improving the lower extremity perfusion. The study also suggested that specific information and Buerger Allen Exercise has to be taught to the patients with selected NCDs in improving the level of lower extremity perfusion.

NURSING IMPLICATIONS

The findings of the present study enable to determine the effectiveness of Buerger Allen Exercise on level of lower extremity perfusion. The findings of the study have several implications for nursing practice, nursing education, nursing administration and nursing research.

Nursing Practice

- Health education is an important aspect of nursing practice. Nurses working in hospital as well as in the community can provide information and skill (Buerger Allen Exercise) and timely helps the Diabetes and Hypertension to understand about the effect of Buerger Allen Exercise and manage the risk of Peripheral vascular disease.
- Evidence based practice should be encouraged about use of Buerger Allen Exercise in nursing practice.

Nursing Education

- Nurse educator can prepare the student nurses to practice the Buerger Allen Exercise in nursing care of patients with NCDs especially Diabetes Mellitus and/or Hypertension.
- Nurse educator may encourage student nurses to conduct project on Buerger Allen Exercise in different areas.
- Nurse educator may divide the students in teams and encourage them to conduct variety of education programmes on various aspects of Buerger Allen Exercise**.**
- The study serves as a base for the nurse educator to teach on the recent trends of Buerger Allen Exercise techniques on evidence based practice.
- Demonstration class may be included as part of in-service education to enhance the nurse's knowledge and skill in Buerger Allen Exercise.
- Regular educational and practical sessions for nurses can be encouraged to improve knowledge and skill in administering Buerger Allen Exercise.

- Continuing nursing education programs on Buerger Allen Exercise can be initiated and conducted periodically.
- The nurse administrator can mobilize the available resource personnel towards the health education for patients.

Nursing Administration

- The nurse administrator can take part in developing protocols related to designing the health education programmes and strategies about the effectiveness of Buerger Allen Exercise.
- Developing a protocol to Buerger Allen Exercises for all patients admitted with NCDs.
- Standard protocol prepared and administer for all patients at the risk of decreased lower extremity perfusion.

Nursing research

- Nurse researcher can encourage clinical nurse to apply the research findings in their daily nursing care activities.
- Dissemination of findings through conference, professional journals will make the application of research findings too effective on evidence based practice.
- Evidence based practice should be encouraged about use of Buerger Allen Exercise in nursing research.

RECOMMENDATIONS

On the basis of the findings of the study, the following recommendations have been made for the further study:

- The study can be replicated by using a large samples there by findings can be generalized.
- A comparative study may be conducted to evaluate the effectiveness of Buerger Allen Exercise with other non-pharmacological measures for improving the level of lower extremity perfusion.
- A descriptive study can be conducted to assess the knowledge and attitude of nurses towards various type of exercise for peripheral vascular disease.
- A longitudinal study can be done on the patients of diabetes and hypertension to elicit the effectiveness of Buerger Allen Exercise.
- The study can be conducted for different samples and in different settings there by findings can be generalized.

SUMMARY

This chapter shows that Buerger Allen Exercise is a simple non-pharmacological intervention which can be carried out independently in the field of nursing. The overall experience of conducting this study was enriching, hence it gave an opportunity to the investigator to acquire new information, skill as well as a rich learning experience. The experience of the investigator during the study and the findings helped the investigator to give suggestions and the recommendations for further studies.

REFERENCES

BOOK REFERENCES

1. Brunner & Suddarth's, (2014). "Textbook of Medical- Surgical Nursing". 13th edition, New Delhi: Wolters Kluwer (p) Ltd. 835-838
2. Brinda Nichols. (2008). "Text book of Medical Surgical Nursing" 7th edition. Lippincott Williams & Wilkins, pp.945-948.
3. Chugh.S.N, (2013). "Textbook of Medical Surgical Nursing". 1st edition, New Delhi: Avichal publishers.
4. Denise F.Polit & Cheryl Tatano Beck. (2008). Nursing Research (8th edi). New Delhi: Wolters Kluwer (India) Pvt. Ltd.
5. Harrison's., Loscalzo. et.al, (2012). "Principles of Internal Medicine". 18th edition, Elsevier India (p) Ltd.
6. Iganatavicius., Linda Workman.M., Mary Mishler. (1995). "Textbook of Medical & Surgical Nursing". 2nd edition, volume-2, America, published by W.B Saunders. 2180-2186.
7. Joyce M. Black, Jane Hokanson Hawks. (2005). "Text book of Medical and surgical Nursing.(Vol.1,pgno. 543-545), New Delhi: Elsevier publication.
8. Kumar., Vinay., Stanley, L. (2005). "Robbins & Cotran Pathologic Basis of Disease" 7th edition, Philadelphia: Elseier/Saunders. Pp. 1194-1195.
9. Lewis, Heitkemper, Dirksen, O' Brien, Bucher. (2013). "Text book of Medical and Surgical Nursing"6th edition. New Delhi: Elsevier publication, pg no.1858-1859.
10. Linton. (2016). " Text book of Medical and Surgical Nursing" 6th edition. Canada: Elsevier publication. Pgno. 315-316.

11. Linda. (2016) ."Understanding Medical and Surgical Nursing" 4th edition. New Delhi: Jaypee publication, pg no.45-50.
12. Nicholas A.Boon, (2006). “Davidson’s principles and practice of Medicine”. 20th edition, New Delhi: Elsevier India (p) Ltd.
13. Patrick,(1991). “Text book of Medical & Surgical Nursing”. 2nd edition, published by Lippincott.
14. Prabhakara. G.N. (2008). Biostatistics (1st edi). New Delhi: Jaypee Brothers Medical Publishers(p) Ltd.
15. Stephen.J. et.al, (2010). “Current Medical Diagnosis & Treatment”. 49th edition, New Delhi: Tata MC Graw Hill Education private limited publishers.
16. Suresh K Sharma. (2014). Nursing Research and Statistics (2nd edi). New Delhi: Elsevier India Private Limited.
17. Susan C. Devid, Candice K. Kumagai. (2011). “ Text book of Medical and Surgical Nursing” 2nd edition. United States: Elsevier publication. Pgno.89-91.
18. Shoback., David, G. Gardner., Dolores. (2011). “Greenspan’s Basic & Clinical Endocrinology” 9th edition, New York: McGraw-Hill Medical, pp. Chapter 17. ISBN 007-162243-8.
19. Thomas Andreoli, (2011). “Essential of Medicine”. 8th edition, Elsevier India (p) Ltd.
20. Williams. (2001). “Text book of Endocrinology” 12th edition. Philadelphia: Elsevier/ Saunders. Pp.1371-1435.

JOURNAL REFERENCES

1. Adler. (2014). Lower extremity amputation in diabetes. The independent effects of PVD, sensory neuropathy, and foot ulcers. US National library of Medicine, 22(7), 1029-35.
2. Amany Edward Seedhom. (2013). Effect of Limb Exercise on foot perfusion among patients with PVD. Journal of Medical Theory & Practice, 24(8), 322-335.
3. Ana Tereza. (2015). Identification of Peripheral Arterial Disease in diabetic patients and its association with quality of life, Physical activity and body composition. Journal Vascular Brasileiro, 14(1), doi: 10.1590/ 1677-5449.20140043.
4. Andrew Makin. (2014). Peripheral vascular disease and hypertension: a forgotten association. Journal of Human Hypertension, 15, doi; 10.1016/ S1995-7645(10)60099-5, 447-454.
5. Aruna. (2015). Effectiveness of Allen Buerger Exercises among people with Type II Diabetes Mellitus by using ABI. International Journal of Pharma & Biosciences, 6(2), 966-970.
6. Ashok Khurana. (2013). Peripheral vascular disease – a silent assassin: Its rising trend in Punjab. Journal, Indian Academy of clinical Medicine, 14(2). 111-114.
7. Balaha M.H.et.al.(2010). Effect of Buerger Exercise on lower extremity perfusion among patients admitted in Medical wards at King Faisal University, Saudi Arabia. The Journal of Medical Theory & Practice, 16(1),1-3.

8. Balaji Nujella. (2013). Efficacy of compressive stockings versus electrical stimulations in improving maximal walking distance in peripheral vascular disease patients- A comparative study. Indian Journal of Mednodent & Allied sciences, 1, 19-21.
9. Bhavana Sosale. (2012). Perippheral Arterial Disease in patients with Type 2 Diabetes Mellitus in South India: The urban Vs rural divide. Journal of Academy of Medical Sciences, 2(3), doi: 10.4103/ 2249-4855.132951. 105-109.
10. Charles U Odenigbo. (2013). Prevalence of Peripheral Arterial Disease in adult hypertension patients in Nnewi, Nigeria. Sahel Medical Journal, 16(1), doi: 10.4103/1118-8561.112058, 15-18.
11. Cheng Chieh Lin. (2014). Prediction of asymptomatically poor muscle perfusion of lower extremities in patients with Type II Diabetes Mellitus using an objective Radionuclide method. Journal of Endocrine Research, 28(3), doi: 10.1081/ ERC-120015064. 265-270.
12. Chyong Fang Chang. (2015). Effect of Buerger's Exercises on improving Peripheral circulation: A systematic review. OJN, 5(2), doi : 10.4236 / 52014/ 1,71, 120-128.
13. David Sadhu. (2013). Effectiveness of Buerger Allen Exercise among patients with Peripheral Vascular Disease in selected hospital, Bangalore. The Journal of Nursing Research, 12(5), 321-327.
14. Dong wang. (2012). Peripheral Arterial Disease among adult diabetic patients attending a large outpatient diabetic clinic at a National Referral Hospital in Uganda: A descriptive cross sectional study. International Journal of Clinical Practice, 9(8), doi: 10.1371 / journal. Pone.0105211, 105-115.

15. Edwin Stephen. (2011). A study was conducted to quantify the distribution of the Peripheral Vascular Disease in diabetics and non – diabetic patients attending angiography. Journal of Diabetes & its Complications, 64, 1-3.
16. Eshcol. (2014). Prevalence, incidence & progression of Peripheral Arterial Disease in Asian Indian Type 2 Diabetic patients. Journal of Diabetes Complication, 28(5), doi: 10.1016/ j.jdiac comp 2014.04.013, 627-31.
17. Jency John. (2015). Effectiveness of Buerger Allen Exercise to improve the lower extremity perfusion among patients with Type 2 diabetes mellitus. International Journal of current Research, 3(4), 358 – 366.
18. Jissy Jacob. (2013). Effectiveness of Buerger Allen Exercise on Peripheral Perfusion among patients with Type 2 Diabetes Mellitus in selected hospital, Bangalore. Rajiv Gandhi University of Health Science, Bangalore.
19. Juma M Al- Kaabi. (2014). PAD in Type 2 Diabetic patients from the United Arab Emirates. Journal of Diabetes and Metabolism, 5, doi: 10.4172/2155-6156.1000388.
20. Korhonen P E. (2014). Patients with resistant hypertension have more Peripheral Arterial Disease than other uncontrolled hypertensives. Journal of Human Hypertension, 29(1), doi: 10.1038/ jhh.2014.65, 46-49.
21. Likhila Abraham. (2015). Effectiveness of Structured teaching programme on knowledge regarding varicose vein and practice of Buerger Allen Exercise in improving peripheral perfusion among workers. Rajiv Gandhi University of Health Science, Bangalore.
22. Lowrence H. Wisham. (2010). A study was undertaken to established a standardized procedure for Buerger Allen Exercise combined with a health

promoting program and investigated its effectiveness in reducing peripheral neurovasculopathy. Journal of Nursing Research, 20(3), 839-840.

23. Luo. Y Y (2012). Risk factors of Peripheral Arterial Disease and the relationship between ABI and mortality from all cause and cardiovascular disease in Chinese patients with hypertension. Journal of Human Hypertension, 21(6), doi: 10.1038/sj.jhh.1002177, 461-466.
24. Makin. (2012). Peripheral Vascular Disease and hypertension: a forgotten association. Journal of Human Hypertension, 15, 447-454.
25. Michel M. Joosten. (2012). Associations between conventional cardiovascular risk factors and risk of Peripheral Arterial Disease in men. The Journal of the American Medical Association, 308(16), doi: 10.1001/jama.2012.13415. 1660-1667.
26. Nancy C. Dolan. (2012). Peripheral Arterial Disease, Diabetes, & Reduced lower extremity functioning. BMJ Open Diabetes Research & Care, 25(1), doi: 10.2337/ diacare.25.1.113, 113-120.
27. Nisha Ghimire. (2013). Effectiveness of Buerger Allen Exercise in improving peripheral perfusion among type 2 diabetes mellitus in selected hospitals at Mangalore. Journal of Diabetes and its Complications. 76(9), 345-358.
28. Nupur Bit (2012). Effectiveness of high intensity training for Intermittent claudication in vascular rehabilitation. Journal of Vascular Disease, 23(8), 156-165.
29. Pranitha. (2010). Effect of Buerger Allen Exercise on lower extremity perfusion among staff nurses working in selected hospitals at Mangalore. Journal of Human Health & diseases, 45(7), 677-689.

30. Priyanka Jayakumar. (2014). Effectiveness of Buerger Allen Exercise in improving the Peripheral circulation among clients with Diabetes Mellitus in selected hospitals at Bangalore. Rajiv Gandhi University of Health Science, Bangalore.
31. Raphael Monteiro. (2012). Risk factors related to a low ABI in the elderly using two different methods of ABI calculation. International Journal of Hypertension, 2012(2012), doi: http:// dx.doi.org/10.1155/2012/163807, 7 pages.
32. Samson Okello. (2014). Prevalence of lower extremity PAD among adult diabetes patients in Southwestern Uganda. Biomed central, 14, doi: 10.1186/ 1471-2261-14-75.
33. Sharon L. Eason. (2010). Diabetes Mellitus, Smoking, & the risk for asymptomatic Peripheral Arterial Disease: Whom should we screen?. Journal of the American Board of Family Medicine, 18(5), doi: 10.3122/ jabfm.18.5.355, 355-361.
34. Sherin Hassan. (2012). Comparison between two vascular rehabilitation training programs for patients with intermittent claudication as a result of diabetic atherosclerosis. Bull. Fac. Ph. Th. Cairo Univ, 17.
35. Sunil Agarwal. (2013). Foot perfusion : a brief period of lower limb exercise in individuals with & without type 2 DM & non critical PVD. Journal of Medical Research Associations, 7(1), 267-278.
36. Tavintharan.S. (2011). Prevalence & Risk factors for Peripheral Arterial Disease in an Asian population with Diabetes Mellitus. Journal of Diabetes Vascular Disease Research, 6(2), doi: 10.1177/ 1479164109336043, 80-86.

37. Tota Kawasaki. (2013). The effect of different positions on lower limbs skin perfusion pressure. Indian Journal of plastic surgery, 46(3), doi: 10.4103 / 0970-0358.121995.
38. Vijayabarathi. (2014). Buerger Allen Exercise for Type 2 Diabetes Mellitus foot ulcer patients. International Journal of Innovative Research in Science, 3(12), ISSN: 2319-8753.
39. Williams.T. (2012). The influence of diabetes and lower limb arterial disease on cutaneous foot perfusion. Journal of Vascular Surgery, 44(4), doi: http://dx.doi.org/10.1016/i.ivs.2005.06.040. 770-775.
40. XiaoMin Yang. (2012). Prevalence of and risk factors for peripheral Arterial Disease in the patients with hypertension among Han Chinese. Journal of Vascular Surgery, 46(1-2), doi: http://dx.doi.org/10.1016/i1 ivs, 296-302.
41. Zheng. L. (2013). Prevalence of and risk factors for Peripheral Arterial Disease in Chinese hypertensive patients with and without known cardiovascular disease. Journal of National Medical Associations, 63(6), 693-699.

Net reference:

- http://www.thecomfortline.com/files/Kolcaba%20Curriculum%20Vitae.pdf
- http://hdr.undp.org/hdr2010.
- www. ncbi. nlm. nih. gov / pubmed.com.
- http://icmr.nic.in/final/causesdeath/causesdeath.htm.
- https:// scholar.google.com.
- http:// www.idf.org/diabetesatlas/5e/the-global-burden.

APPENDIX – A

Letter seeking Permission to conduct Pilot and Main study

Om Namo Narayani

Service with Love

SRI NARAYANI COLLEGE OF NURSING

(A Unit of Sri Narayani Hospital & Research Centre)

Sripuram, Thirumalaikodi, Vellore - 632 055.
Vellore District, Tamilnadu. India.

Dr. N.BALAJI, Ph.D., FIMSA, FACSc.
Director

04.07.2015

To

Dr. Aravindan Nair, M.S,M.N,A.M.S.,

The Medical Superintendent,

Sri Narayani Hospital and Research Centre,

Vellore.

Dr Anoop Rajan to guide the students

Respected Sir,

Sub: Permission to conduct Research Dissertation at Sri Narayani Hospital And Research Centre – request regarding.

This is for your kind notice that, **Mrs.N.Priya,** II year M.Sc Nursing student of Sri Narayani College of Nursing is doing a research dissertation on **"Effectiveness of Buerger-Allen Exercise on levels of lower extremity perfusion among patients with selected Non Communicable Diseases (NCDs) admitted at Sri Narayani Hospital and Research Centre (SNHRC), Vellore"**, which is to be submitted to The Tamil Nadu Dr.MGR Medical University, as partial fulfillment for awarding of the degree of M.Sc (N).

Hence forth, I request your good selves to accord permission for data collection at SNHRC.

Kindly do the needful.

Thanking you,

Yours faithfully,

PRINCIPAL

PRINCIPAL
SRI NARAYANI COLLEGE OF NURSING
VELLORE - 55.

Phone : 0416 - 2270225, 2270224, Fax : 0416 - 2270224
E-mail : aosnc@snhrc.org

APPENDIX - B

CERTIFICATION OF VALIDATION

This is to certify that demographic variables & check list for assessing lower extremity perfusion for the research study on **"Effectiveness of Buerger Allen Exercise on levels of lower extremity perfusion among patients with selected Non Communicable Diseases (NCDs) admitted at Sri Narayani Hospital Research Centre (SNHRC), Vellore",** prepared by **Mrs.N.Priya**, II Year M.Sc., Nursing Student of Sri Narayani College of Nursing, has been validated.

Name :

Designation :

Date :

Institution :

Signature :

APPENDIX – C

LIST OF EXPERTS FOR TOOL VALIDATION

1. **Dr. Anoop Rajan, MBBS.,M.D.,**
   Consultant of General Medicine,
   Medical Research Guide,
   Sri Narayani Hospital Research Centre (SNHRC),
   Vellore.

2. **Prof. Mrs. Ilavarasi Jesudoss, M.Sc. Nursing.,**
   Dept. of Medical Surgical Nursing,
   CMC College of Nursing,
   Vellore.

3. **Prof. Mrs. Ida Nirmal, M.Sc. Nursing.,**
   Dept. of Medical Surgical Nursing,
   CMC College of Nursing,
   Vellore.

4. **Prof. Mrs. Sophia Vijayananthan , M.Sc. Nursing.,**
   Dept. of Medical Surgical Nursing,
   CMC College of Nursing
   Vellore.

5. **Mr. Muthu Rathinam, M.Sc. Bio Statistics.,**
   Bio Statistician,
   Sri Narayani College of Nursing,
   Vellore.

APPENDIX - D

CERTIFICATION OF ENGLISH EDITING

To whomsoever it may concern

This is to certify that the content prepared by Mrs. N. Priya on" **Effectiveness of Buerger Allen Exercise on levels of lower extremity perfusion among patients with selected NCD's admitted at Sri Narayani Hospital And Research Center, Vellore"** has been edited by me in English language.

Signature 25.1.16

M.A., M.Ed., M.Phil.

தலைமை ஆசிரியை
ஸ. வே. ரா. நாகம்மை
அரசு மகளிர் மேனிலைப் பள்ளி
வேலூர் - 632 001, தமிழ்நாடு.

APPENDIX – E

CERTIFICATION OF TAMIL EDITING

To whomsoever it may concern

This is to Certify that **Mrs. N.Priya,** II M.Sc Nursing, Department of Medical Surgical Nursing has to conduct the dissertation for the partial fulfillment of Degree course **"Effectiveness of Buerger Allen Exercise on levels of lower extremity perfusion among patients with selected NCD's admitted at Sri Narayani Hospital And Research Center, Vellore".** She has prepared the tool and content. It has been edited by me in Tamil language.

K. Sudhamathi

Signature

Mrs. K. SUDHAMATHI, M.A., M.Phil.(Engl)
B.T. Teacher
E. V. R. N. G. G. Hr. Sec. School
VELLORE - 632 001.
B.T. Tamil.

APPENDIX –F

Letter requesting participation in the study

Dear participant,

I **Mrs.Priya. N**, II year M.Sc Nursing student of Sri Narayani College of Nursing conducting study on **"Effectiveness of Buerger-Allen Exercise on levels of lower extremity perfusion among patients with selected Non Communicable Diseases (NCDs) admitted at Sri Narayani Hospital and Research Centre (SNHRC), Vellore**," as a partial fulfillment of my Masters Degree. In this regard I would like to teach Buerger Allen Exercise which may improve your lower extremity perfusion I assure you that the information obtained from you will be strictly confidential and will be used for the study purpose only. I need your whole-hearted cooperation in this study to gather information and I will be grateful to you for the same.

Thanking you in anticipation,

Yours sincerely,

Mrs. Priya. N

CONSENT

I have been informed for the purpose of the study and agree to participate in the same.

Date:

Place:

Signature of participants

ஆய்வில் பங்கேற்பதற்கான கோரிக்கை கடிதம்

அன்பான பங்கேற்பாளருக்கு,

ஸ்ரீ நாராயணி செவிலியர் கல்லூரியில் இராண்டாம் ஆண்டு முதுகலை செவிலியர் பட்டப்படிப்பு படிக்கு திருமதி.ந.பிரியா ஆகிய நான் நீரிழிவு நோய் மற்றும் உயர் இரத்த அழுத்தம் உள்ள நோயாளிகளுக்கு உடற்பயிற்சியை படிபிக்க உள்ளேன். இதனால் நோயாளிகளின் காலின் இரத்த ஓட்டம் அதிகரிக்கும். உங்களிடம் இருந்து பெறப்படும் தகவல்கள் நம்பகமாக இருக்கும் என்று உறுதி அளிக்கிறேன். இந்த தகவல்கள் படிப்பிற்காக மட்டும் உபயோகிக்கப்படும். உங்கள் மனப்பூர்வமான ஒத்துழைப்பை வேண்டுகிறேன்.

நன்றி

உங்கள் உண்மையுள்ள,

ந.பிரியா

அனுமதி

எனக்கு இந்த ஆய்வின் நோக்கம் தெரிவிக்கப்பட்டது. நான் இதில் பங்கேற்க சம்மதிக்கிறேன்.

தேதி :

இடம் :

பங்கேற்பாளரின் கையொப்பம்

APPENDIX- G

Section:A -Demographic Variables

1. Age (in years)

1.1. 31-40

1.2. 41-50

1.3. 51-60

1.4. Above 60

2. Gender

2.1. Male

2.2. Female

2.3. Others

3. Education.

3.1. Illiterate

3.2. Primary education

3.3. Secondary education

3.4. Graduate

3.5. Post graduate and above

4. Occupation

4.1. Home maker

4.2. Unemployed

4.3. Unskilled laborer

4.4. Skilled laborer

4.5. Professional

5.Type of work

5.1. Sedentary work

5.2. Moderate work

5.3. Heavy work

6. Diet pattern

6.1. Vegetarian

6.2. Mixed

7. BMI

7.1. below 18

7.2. between 19-24

7.3. between 25-30

7.4. above 30

8. Habits

8.1. Smoking

8.2. Alcohol

8.3. Both

8.4. Others

8.5. No ill habits

9. Type of NCD's

9.1. Diabetes Mellitus

9.2. Hypertension

9.4. Both 9.1& 9.2

10. Duration of illness

10.1. < 5 years

10.2. 6-10 years

10.3. 11-15 years

10.4. > 15 years

Section:B

Part: I-Ankle Brachial Index Scale

Ankle Brachial Index Scale for assessing lower extremity perfusion

S.NO	ABI VALUE	INTERPRETATION	RECOMMENDATION
1.	> 1	Normal	None
2.	1.0-0.8	Some Arterial Disease	Treat risk factors
3.	0.8-0.5	Moderate Arterial Disease	Refer to Vascular Specialist
4	Less than 0.5	Severe arterial Disease	Refer to Vascular Specialist

Ankle Brachial Index Scale- Assessment of lower extremity perfusion by using ankle brachial index scale and was done by standard manual sphygmomanometer and standard hand held Doppler.

Ankle and brachial pressure with Doppler- BP cuff tied on upper arm, palpate the brachial pulse, then place the Doppler after applying gel and inflate at about 20 -30 mmHg where pulse is not audible and then deflate and mark the first heard pulse as the systolic blood pressure and repeat for the other arm . BP cuff tied on 2.5 cm above the malleolus ,palpate the dorsalispedis or posterior tibial pulse, then place the Doppler after applying gel and inflate at about 20 -30 mmHg where pulse is not audible and then deflate and mark the first heard pulse as the systolic blood pressure and repeat for the other extremity .

Formula for Calculating Ankle Brachial Index

Divide the higher of the dorsalispedis systolic pressures for each ankle by the higher of the two upper extremity brachial systolic pressures to obtain the ankle brachial index for each of the lower extremities. Upon completing calculations, compare each reading with the interpretations below.

Ankle brachial Index = Highest ankle pressure / Highest brachial arm pressure

Part:II-Checklist For Selected Clinical Features Of PVD

S.NO	PARAMETER	NORMAL 0	MILD 1	MODERATE 2	SEVERE 3
1	Peripheral pulse	Normal	Weak pulse	Non palpable	Absent
2	Capillary refill	1-2	3	4	>4
3	Edema	No edema	Mild	Moderate	Severe
4	Temperature	Warm	Mild	Moderate	Cold
5	Pain	No pain	Mild	Moderate	Severe
6	Colour of the skin	Normal	Pale	Black	Reddish

Score Interpretation

S.NO	SCORE	INTERPRETATION
1	**0-4**	**Normal-Absence of clinical features of PVD**
2	**5-9**	**Mild clinical features of PVD**
3	**10-14**	**Moderate clinical features of PVD**
4	**15-18**	**Severe clinical features of PVD**

APPENDIX - H

பகுதி – அ

பங்கேற்பாளரின் எண். :

1) வயது (வருடங்களில்)
   அ) 31 – 40 வயது வரை
   ஆ) 41 – 50 வயது வரை
   இ) 51 – 60 வயது வரை
   ஈ) 60 வயது மேல்

2) பாலினம்
   அ) ஆண்
   ஆ) பெண்
   இ) மற்றவை

3) கல்வி தகுதி
   அ) படிப்பறிவில்லாதவர்
   ஆ) ஆரம்ப கல்வி
   இ) இடைநிலை கல்வி
   ஈ) பட்டதாரி
   உ) பட்டதாரி மற்றும் அதற்கும் மேல்

4) தொழில்
   அ) வேலையில்லாதலர்
   ஆ) குடும்பத்தலைவி
   இ) தொழிற்பயிற்சி பெறாத தொழிலாளி
   ஈ) பயிற்சி பெற்ற தொழிலாளி
   உ) தொழில் முறை தொழிலாளி

5) வேலை வகை
   அ) உடல் உழைப்பு தேவைக்படாத வேலை
   ஆ) மிதமான வேலை
   இ) அதிக வேலை

6) உணவு முறைகள்

அ) சைவம்

ஆ) சைவம் மற்றும் அசைவம்

7) உடல் பொருண்மை எண்.

அ) 18க்கும் குறைவாக

ஆ) 19 முதல் 24 வரை

இ) 25 முதல் 30 வரை

ஈ) 30 க்கும் மேல்

8) தனிப்பட்ட பழக்கங்கள்

அ) புகைபிடித்தல்

ஆ) மது அருந்துதல்

இ) இரண்டும்

ஈ) மற்றவை

உ) எதுவுமில்லை

9) நோயின் வகைகள்

அ) நீரிழிவு நோய்

ஆ) உயர் இரத்த அழுத்தம்

இ) இரண்டும்

10) நோயின் தாக்கம் (வருடங்களில்)

அ) 5 ஆண்டுகளுக்கு கீழ்

ஆ) 6 – 10 ஆண்டு வரை

இ) 11 – 15 ஆண்டு வரை

ஈ) 15 ஆண்டுகளுக்கு மேல்

APPENDIX-I

Guidelines Of Buerger Allen Exercise

Buerger exercises are a system of exercises for arterial insufficiency of lower limbs, consisting of legs elevation, followed by dependency of the legs, and finally horizontal position of legs for rest. Published in 1924 by Leo Buerger (1879-1943), New York Phycisian.

Buerger exercises augmented by active exercises of the feet. These exercises consist in flexion, extension, and circumduction of the ankles and are done during the phase of dependency of the legs, as suggested in 1931 by Arthur W. Allen (1887-1958).

Buerger-Allen exercise - Specific exercises intended to improve circulation to the feet and legs. The lower extremities are elevated to a 45 to 90 degree angle and supported in this position until the skin blanches (appears dead white). The feet and legs are then lowered below the level of the rest of the body until redness appears (care should be taken that there is no pressure against the back of the knees); finally, the legs are placed flat on the bed for a few minutes. The length of time for each position varies with the patient's tolerance and the speed with which color change occurs. Usually the exercises are prescribed so that the legs are elevated for 2 to 3 minutes, down 5 to 10 minutes, and then flat on the bed for 10 minutes.

Step 1 – elevation

The lower extremities are elevated to a 45 to 90 degree angle and supported in this position until the skin blanches, for about 2 to 3 minutes.

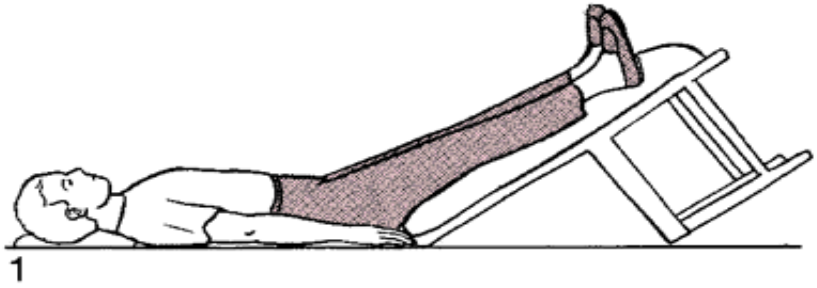
Step 2 – dependency

The feet and legs are then lowered below the level of the rest of the body until redness appears (care should be taken that there is no pressure against the back of the knees); for about 3-5 minutes.

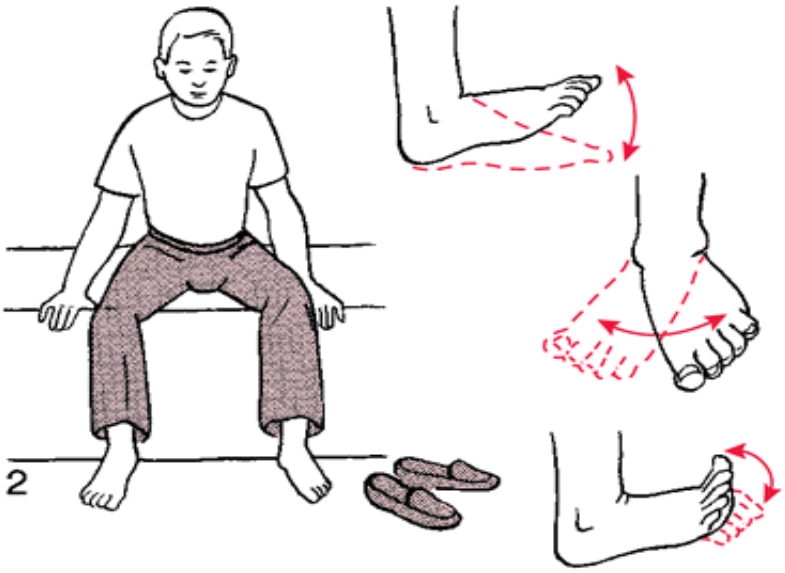
Step 3 – horizontal

The legs are placed flat on the bed in a horizontal position for 3-5 minutes.

The length of time for each position varies with the patient's tolerance and the speed with which color change occurs. Usually the exercises are prescribed for about 12 -13 minutes. Three series of steps can be repeated for a frequency of 4 times a day.



1



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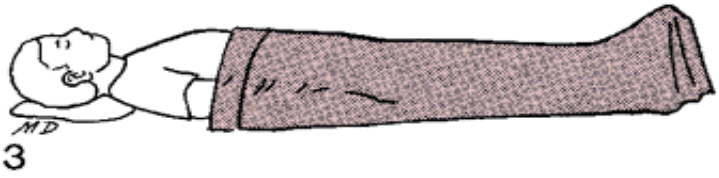

3